FOOD ENGINEERING

March 1953

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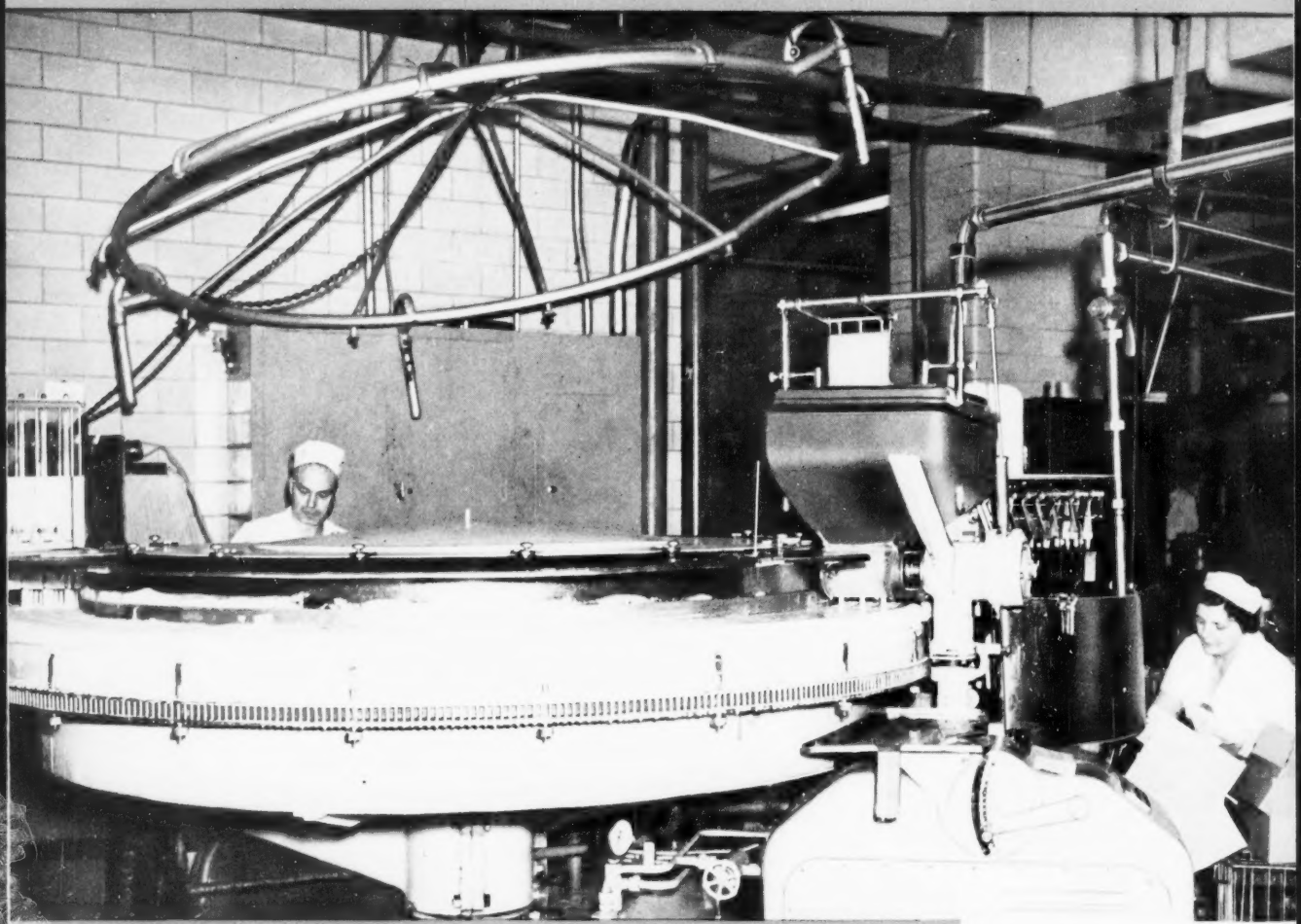

ROTARY FREEZING UNIT at Borden's cuts labor 40 percent in production of coated ice cream stick novelties. (Page 64)

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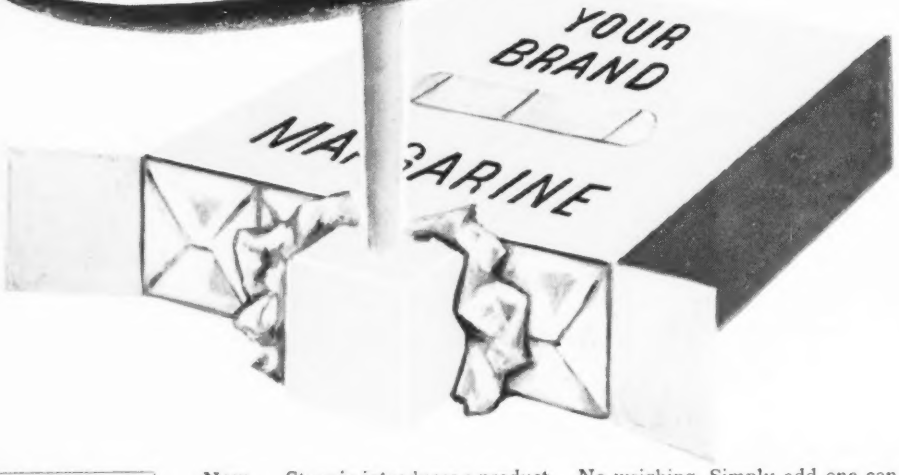

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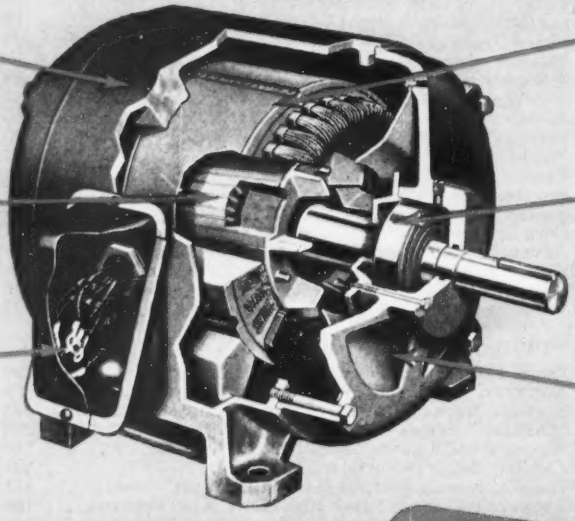
Look for These 6 Signs of Good Motor Design



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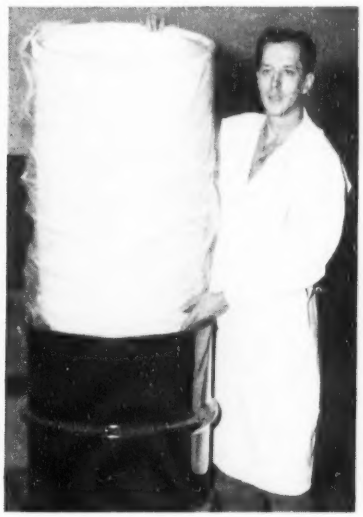
PRACTICAL IDEAS



Rapid Way to Line Drums With Film

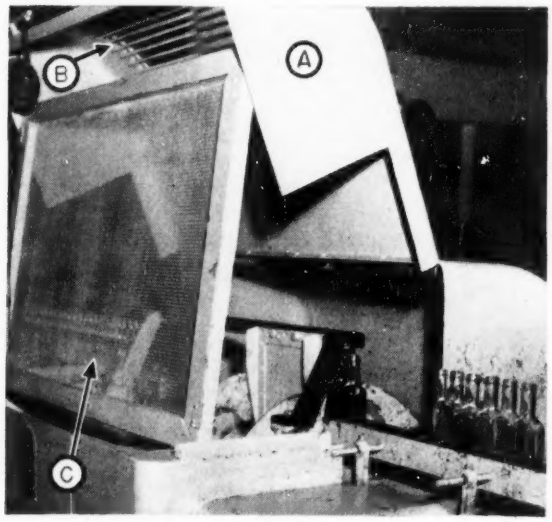
Inserting polyethylene liners in drums before filling them with jellies was a tedious, man-hour consuming task at our plant before we adopted our present speed-up method.

Formerly, the worker had to reach to the bottom of the steel shipping drum in an effort to force liner to conform to its shape. Procedure was time consuming and fatiguing.

Now, when steel drum is prepared for filling, liner is first fitted over hollow cylindrical form, diameter of which is several inches less than that of metal container. This hollow form was made by cutting the bottom from, and painting, a fiber drum such as is used for shipment of dry materials.

This is how we now prepare steel container for filling with jelly: First step is to place mouth of polyethylene bag over fiber cylinder (left photo). Then bag is lowered over up-ended cylinder (center photo) until bag bottom is flush with form.

Next, liner and form are lowered into steel drum (right photo). And then lightweight cylinder is easily removed, leaving bag in proper liner-position in drum.—*Robert P. Korn, Plant Engineer, Henry & Henry, Buffalo.*



Ends Broken Glass Hazard

It was a very simple matter to remove an accident hazard inherent in the design of one of our bottle washing machines. At the same time, we reduced labor in clean up of glass pieces (often widely scattered over the floor) and in cleansing the machine itself.

This is how the machine operates, what constituted the hazard, and how it was overcome. Before filling, bottles for A-1 sauce are cleaned in a machine which rotates six bottles from the line of conveyor travel to an up-side-down position. Here, a blast of compressed air removes dust, etc., after which bottles are rotated up and returned to the conveyor.

If bottles break when rotated downward inside the machine housing, flying glass is confined. However, when breakage occurs as bottles are gripped by the arm which swings them down—an exposed position—flying glass can be dangerous.

The protective cover-device—(A) in photo—built into the machine, is undoubtedly adequate for many sizes and shapes of glass containers, but not ours. Spacing of the rods (B), which form the protective grill, is too wide, thus permitting too many pieces of glass to escape and fly a considerable distance from the machine.

This condition was corrected when the hinged, grill-laced front was propped up by a removable, iron frame screen (C). Mesh of this screen is such that glass particles having sufficient momentum to reach the screen are confined. Yet, visibility is not impaired.

Prior to this change, access to the machine for cleaning was gained only when the heavy grilled front was raised. Now, for cleaning, the machine is accessible from the ends—without disturbing the screen or lifting the front. And it is safe to have the ends open, since glass travel is limited to the area protected by the screen.—*Lewis Richardson, Food Div., Mechanic (Retired) C. F. Heublein & Bro., Inc., Hartford.*

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you
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laying
bricks
for
your
new
plant

see General American about GATX
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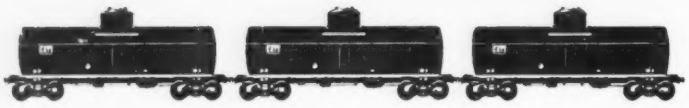

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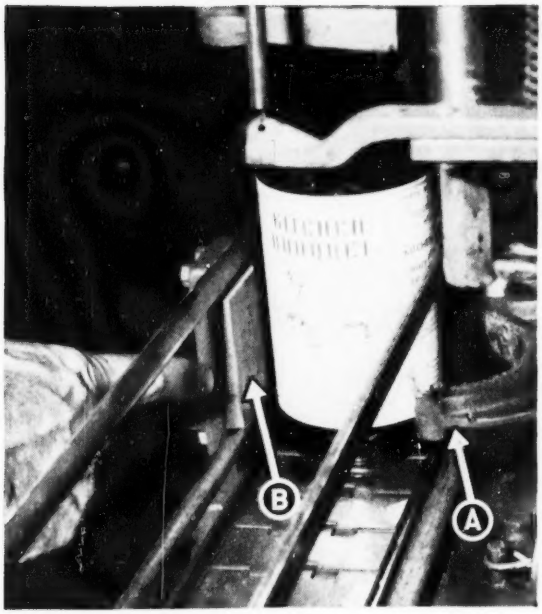
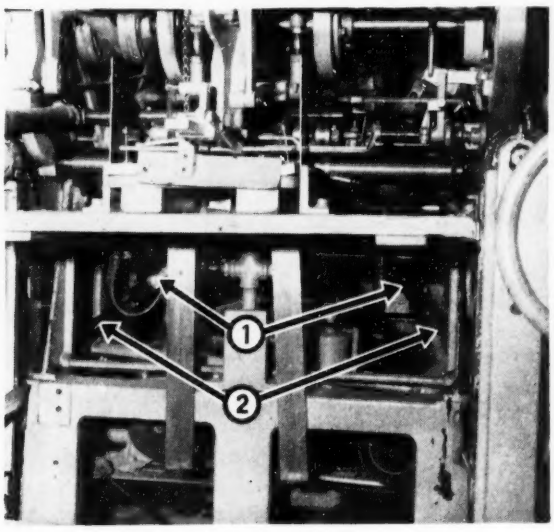


Breakage Stopped by Piece of Rubber

Loss of many bottles and contents, due to breakage, occurred at our capping machine until a 3-sq.-in. metal plate was replaced by one made of rubber.

Damage to bottles was result of pressure of half-round centering arm—(A) in photo—pushing container against metal positioning plate (B), to locate bottle for capping.

Though the hollow in arm (A) is lined with cushioning material, breakage continued as long as metal positioning plate was in use. Damage ended when this plate was replaced by a piece of firm—but not hard—rubber of same size.—*A. P. Bullotta, Kitchen Bouquet Sauce Superintendent, Grocery Store Products Co., West Chester, Pa.*



Infra-Red Solves Humidity Problem

Periodically, moisture in the air unfavorably affected our carton glueing operation, until we installed a pair of infra-red lamps directed at the glue rolls. Heat from the lamps—(1) in photo—not only prevents excessive absorption of moisture by adhesive during humid periods, but also hastens drying and setting of glue after application to carton surfaces.

An easy way to mount infra-red bulbs is to screw them into sockets of gooseneck desk-lamp (2). These permit angling bulbs to obtain maximum advantage of their heat.—*D. C. Cornell, Cream of Rice Superintendent, Grocery Products Co., West Chester, Pa.*

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when your item is printed and if it is judged best for the month you will get an additional payment of $50.

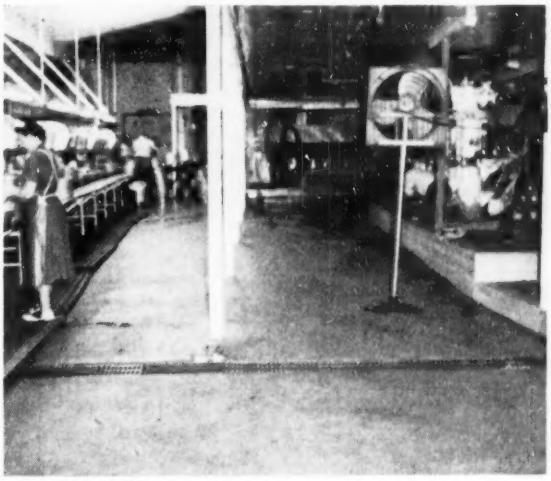
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and author's name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

JANUARY PRACTICAL IDEA voted best was "Simple Temperature-Humidity Control," submitted by F. De Vaux, Chief Engineer, and W. Jackson, Assistant Chief Engineer, John J. Felin & Co., Philadelphia. Discussed was improvement in temp.-rh. control by using overhead fin-coils, supplying cold air by gravity flow, in place of a blast-type system.



Paint on Floors Serves Two Purposes

Since we surfaced all our canning plant floors with a rubber-base paint, not only has wear and erosion diminished, but floors are easier to clean. In addition, worker morale has been favorably affected.

No longer are these surfaces (photo) cut and rutted by vegetable acids and other destructive liquids resulting from preparation of tomato products, dry lima beans, and kidney beans for canning.

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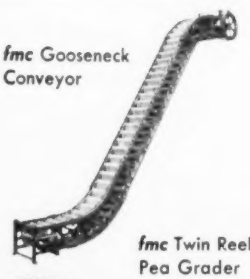

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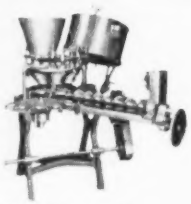
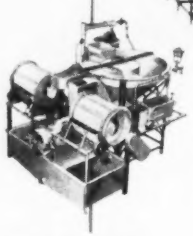


fmc 8 Station Pea and Bean Filler



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Though aisles and passageways are subjected to heavy truck traffic, the protective surface lasts through the processing season.

Color selected was leaf green, not only improving plant appearances, but also imparting an air of added cleanliness. From the time floors were first covered, workers have been enthusiastic.—*W. A. Free, Jr., Hungerford Packing Co., Hungerford, Pa.*

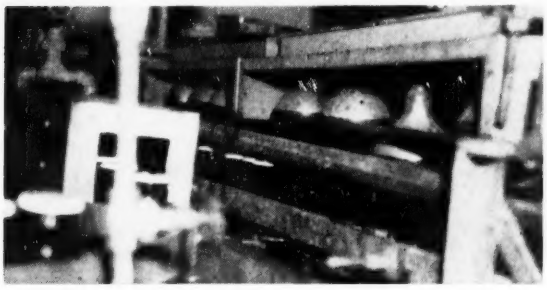
Novel Radiator Guard Has Many Assets

Merely by fabricating large size company initials—out of pipe—as a part of radiator guards mounted on our truck fronts, we have accomplished several noteworthy objectives.

1. Grille and radiator damage from front-end collisions has been reduced.

2. A worthwhile eye-attracting merchandising asset has thus been added.

Referring to the latter, the large initial (see photo), visible on an approaching truck at great distances, serves as an effective type of promotion.—*James Owens, Fleet Manager, Abbotts Dairies, Inc., Philadelphia.*



Sterilizes Caps With Infra-Red Lamps

Problem of killing airborne wild yeast and mold spores on inner surface of jar caps and in head-space above hot pasteurized jelly was serious at our plant until an answer was found in limited application of infra-red rays.

Heat of jelly at filling temperautre sterilizes inside surface of jars in contact with product. However, space above—including inner cap surface—may become the source of yeast and mold contamination.

First attempt to heat-sterilize these areas and surfaces was by hot water sprays located in feed section of continuous spray cooler, through which jars pass after filling. But this hot-water method was found to be insufficient unless application was excessively long.

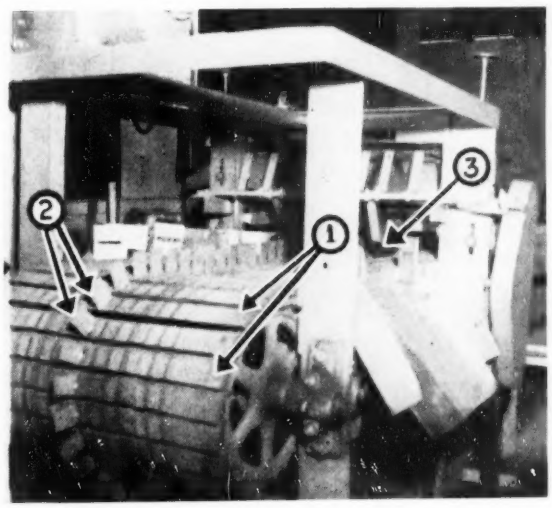
A bank of infra-red lights was then suspended a few inches above jar height, also in the feed end of cooler. Number of lights required and effective distance they should be placed above jars was determined by thermocouple readings.

Although temperatures in excess of 200 deg. F. are obtained on underside of the lid, or jar neck, and in space above jelly, time under the lamps is so short, product is in no way affected by heat of lamp.

Another improvement then augmented the performance: Jelly jars move on a flat-top conveyor across the receiving end of belt in heater-cooler. Then a plow travels the length of flat-top conveyor, pushing jars onto a wire-mesh cooler belt.

This plow is set at an angle to its direction of travel, like a snow plow. It moves along guides parallel to the flat-top conveyor. Plow is pushed back and forth by an arm connected to an endless roller chain. Top of chain travels in forward direction, pulling plow against jars on flat-top conveyor.

Then chain end of arm goes around chain sprocket and travels in reverse direction, pulling plow back to start another stroke. Ends of arm are pivoted to permit arm to swing around sprockets.—*George Garnatz, The Kroger Co., Cincinnati.*



How Cutter Efficiency Was Improved

Four departures from conventional design have stepped up efficiency of our asparagus cutters. Here are the changes we made:

1. Fabric belt conveying "grass" through cutter was replaced with conveyor made of wood slats—(1) in photo. Though slats become scored by action of the cutting knives, they function efficiently and show little serious wear.

2. Width of conveyors was doubled, increasing productivity capacity by 50 percent since workers can now feed asparagus from both sides. As a result, floor-space requirements for cutting operation have been reduced.

3. Metal uprights (2) were attached to each slat to form a fin down center of conveyor. Against these dividers asparagus can be correctly aligned from both sides for cutting operation.

4. Conventional circular, knife-edge blades, usually used for cutting "grass," were replaced by notched or saw-

3 Successful
BOTTLE LABELING GLUES

. . for withstanding moisture and low temperatures. Holds labels securely without crystallizing or dropping off because of quick changes in temperature and humidity during shipping and storage.

Paisley SCIENTIFIC ADHESIVE SERVICE

1 "Cooler-Proof"

FOR *DRY MECHANICAL* REFRIGERATORS

A remarkable Vegetable Base Labeling Glue of modern scientific Adhesive design. 1. It fixes foil, varnished or lacquered labels on hot, cold, wet, or greasy bottles. 2. Accepts changeovers from one size to another. 3. Improves production on *old* labelers. 4. Won't mess, drip, or spatter. 5. Produces a water-resistant, tacky glue film. 6. Will not dry glassy-hard on picker arms between runs. 7. Labels wash off quickly and easily in bottle washer. 8. Economical in price and performance.

2 "ICESTIK"

FOR *CHIPPED ICE* COOLERS

Bottles stored in chipped ice keep their labels trim and tight when "ICESTIK" does the job! Now labels are firmly fixed to wet or dry bottles at speeds up to 132 per minute! Economical, clean working, odorless . . "ICESTIK" can average 50,000 bottles to a gallon. No stringing, webbing, feathering or spitting. Safeguard the appearance of *YOUR* bottles—order this better scientific Animal Base Glue today!

3 "IMMERSIT"

FOR *"UNDER WATER"* COOLING

A new Casein Base, water-resistant Glue. Keeps labels in perfect condition on the bottles *for seven days or longer* under immersion in room temperature water. Machine parts clean up quicker . . Labels wash off easier . . in relation to *ice water-proof* qualities, than any other Casein Glue. Get a trial shipment at once!

TEAR OFF HERE . . PASTE ON LETTERHEAD AND MAIL TODAY!

Gentlemen:

Please send, at once, on approval, at special 55 gallon drum price, the following trial 5 gallon shipments of:

- ☐ COOLER-PROOF Vegetable Base Bottle Label Glue
- ☐ ICESTIK Animal Base Bottle Label Glue
- ☐ IMMERSIT Casein Base Bottle Label Glue
- ☐ Mail promptly, complete information on all Paisley Scientific Bottle Labeling Adhesives for Brewers.

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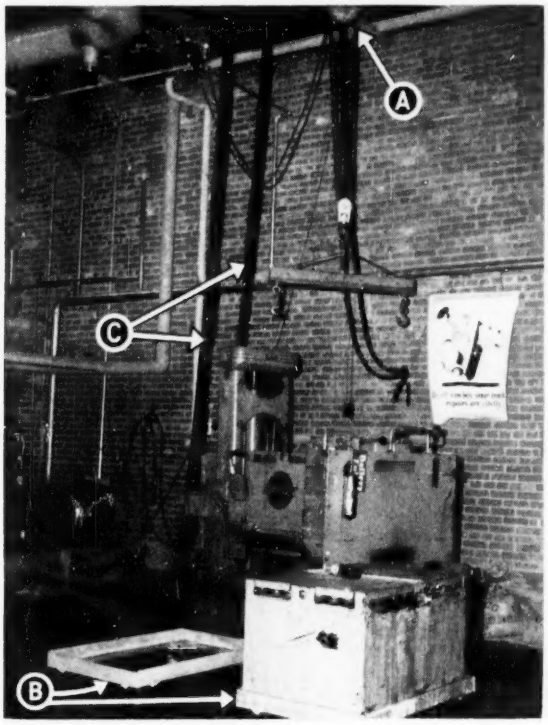
toothed blades (3). These have proved more efficient for cutting asparagus than the conventional blades and require less frequent sharpening, minimum maintenance.—*L. M. Jordan and Dorsey Davis, Phillips Packing Co., Cambridge, Md.*



Battery Charging Aids

Three ideas, practical and simple, ease the job of battery charging and speed operation.

Batteries used for power on industrial trucks, though heavy and unwieldy, are easily lifted from the machine by an electric hoist—(A) in photo—attached to the charging room ceiling.

An angle-iron frame (B) mounted on casters, provides a stable—though mobile—rest for the battery during charging. Low center of gravity makes carts tip-proof.

Suspending charging cables (C) from ceiling extends their radius of operation when in use, yet keeps them off the floor and out of the way when idle.—*H. F. Davis, Chief Engineer, Danahy-Faxon Stores, Inc., Buffalo.*

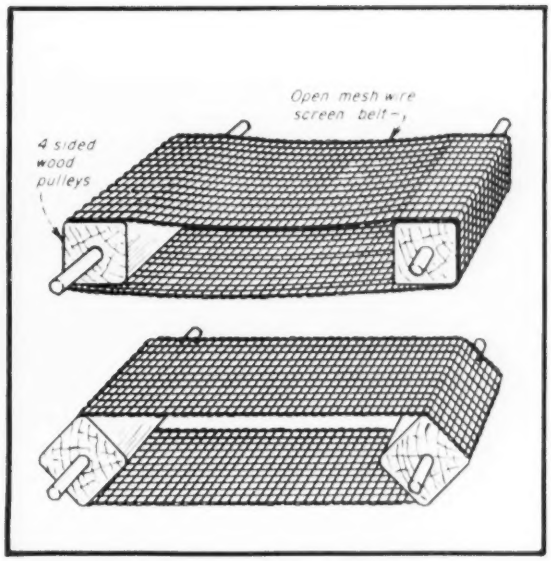
Peel Oils Preserved by Dry Ice

No doubt it is common, among those who flavor with orange, lemon, and lime oils, to detect flavor deterioration in the oil remaining in container, once it has been opened.

Removing the closure permits air to enter bottle or carboy, resulting in unsaturated constituents of the oil being oxidized into products with sharp, bitter flavors. The more often closure is removed, the greater the deterioration.

However, such oil oxidation is easy to prevent:

Drop a small piece of dry ice into container before reclosing. Heat of oil will evaporate the solid carbon dioxide to gas, which will blanket oil and fill space above it, thus preventing oxidation.—*FE Staff.*

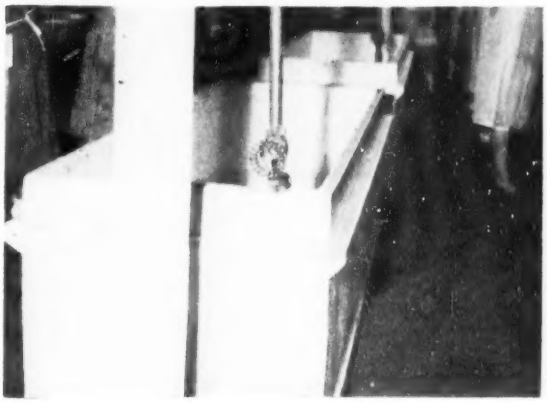


Easy-to-Make Vibrating Screen

A device which serves efficiently for continuous sifting, dewatering or separating, can be constructed from two flat-sided wood blocks (see sketch) which serve as pulleys, and a length of wire mesh conveyor belt.

Extent of vibration is governed by two factors—cross-sectional dimensions of the wood pulleys and speed of belt. The larger the pulley cross-section, the greater the vertical movement. And the faster the speed of the belt, the more frequent the vibrations.

Mesh size of belt should be varied according to size of products to be dewatered or separated.—*James H. Hall, Rowley, Mass.*



Burial Vaults Make Ideal Wash Tanks

In our whole-tomato canning plant, suitable equipment for washing buckets, pans and other implements, provided a real problem. That is, until we selected concrete burial vaults to serve as wash tanks.

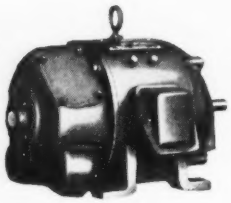
Concrete structures (see photo) are the right size and shape for cleaning operations. Two of them fit between roof supports with passage space between—plus ample aisle space. They do not corrode or rust, nor is it necessary to keep them filled with water in off season as is required with wood tanks. Cost is reasonable. Furthermore, years of use have proved them sturdy.—*W. A. Free, Jr., Hungerford Packing Co., Hungerford, Pa.*

GUARD YOUR PRODUCTION AGAINST the Hazard of SPLASHING LIQUIDS

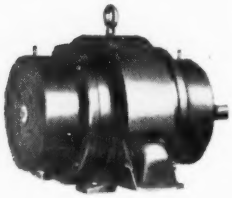
WITH

Century SPLASH PROOF MOTORS

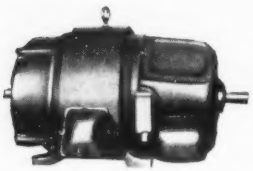
Century 7½ HP Type RS Single Phase Repulsion Start Induction Brush Lifting Splash Proof Motor.



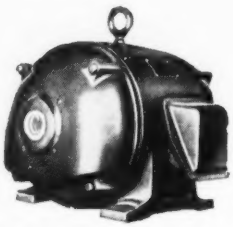
1 to 7½ HP Direct Current Splash Proof Motor.



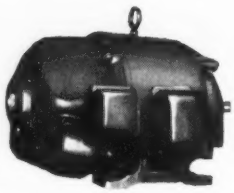
150 to 400 HP Type SC Squirrel Cage Induction 3 Phase Splash Proof Motors.



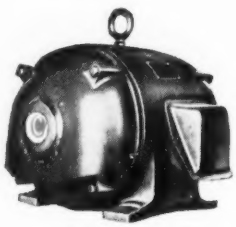
30 to 100 HP Type SR Slip Ring Induction 3 Phase Splash Proof Motors.



1 to 125 HP Type SC Squirrel Cage Induction 3 Phase Splash Proof Motors.



3 to 25 HP Type SR Slip Ring Induction 3 Phase Splash Proof Motors.



1 to 20 HP Type CS Capacitor Start Induction Single Phase Splash Proof Motor.

Keep the vital parts of your motors dry —even when the full force of a hose is turned directly on them. Century Splash Proof motors eliminate production losses due to dripping or splashing liquids or falling solids. They also protect against rain, snow, sleet or hail on outdoor installations.

Century Splash Proof motors are available in a wide range of types and sizes for all popular applications. Other types and ratings are available to meet your electric power requirements. You can specify Century motors with confidence.

Century motors are built in sizes ⅛ to 400 horsepower.

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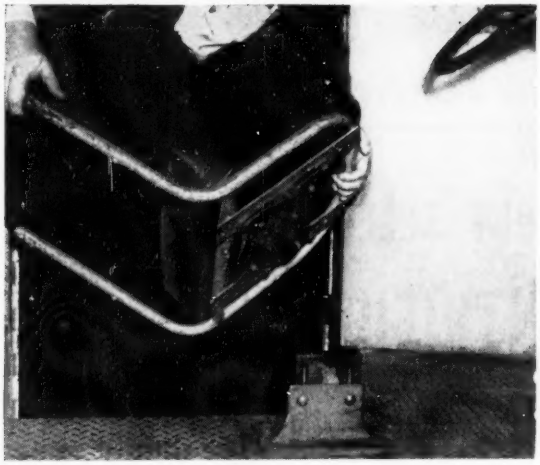
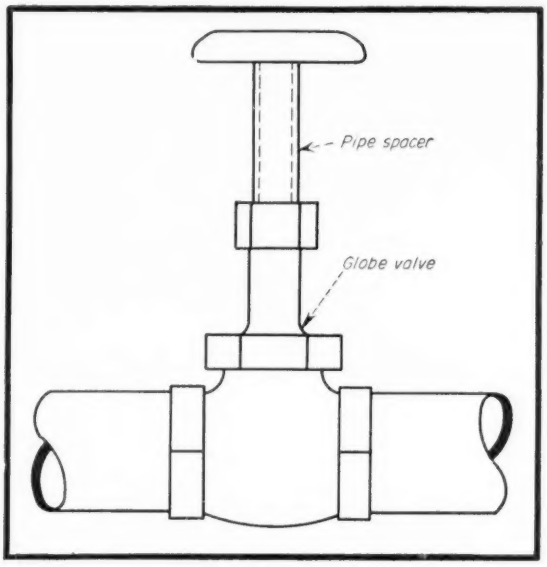


Under-Seat Switch Saves Motor Fuel

To prevent gas waste, and overheating due to motor idling while drivers are making deliveries, The Indiana Division garage of the Bowman Dairy Company, Chicago, installed ignition switches under the driver's seats. Now, whenever the driver arises to leave the truck this device automatically shuts off the motor.

Operation of the unit is simple and should give years of service. It consists of a microswitch which is mounted on the coil spring below the seat and which makes contact when the spring compresses under the drivers weight. The switch circuit is merely tied in series with the regular ignition switch—so the motor can be shut off while the driver is still seated.

By adjusting the microswitch it is possible to have it make contact only when the seat spring is compressed by an adult weight. Thus, mischief-minded small fry cannot get into trouble. Also, of course, automatic motor shut off always acts for the forgetful driver.—*Richard Lenski, Garage Foreman, Bowman Dairy Co.*



Contrivance Keeps Valve Open

Sometimes it is expedient to install, in a line, a valve which is never to be closed except in an emergency.

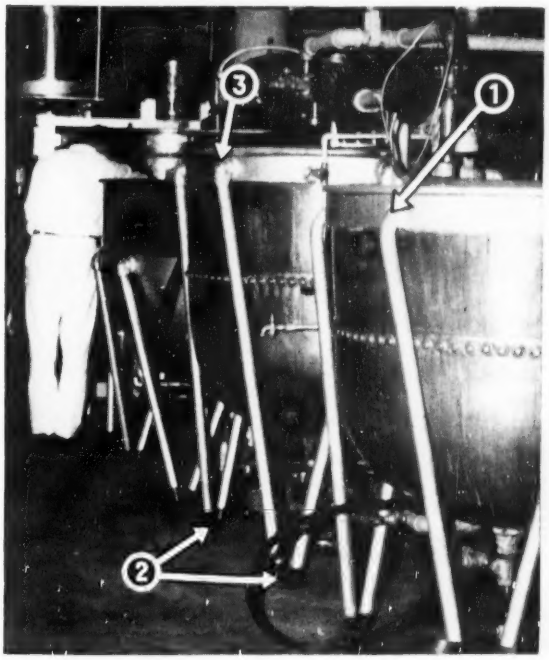
Also, in processing-line rearrangements it may be advisable to leave a no-longer-needed valve in a line rather than rip out a section to remove it. In either case it may be necessary to prevent closing such a valve except in the emergency.

Here is how to prepare a simple attachment which avoids careless or accidental closing of normally un-used valve.

First, fully open valve. Next measure diameter of stem and its length between body and handle. Then select a piece of pipe or tubing (see sketch) which will fit around stem. Cut pipe to exact stem length.

After handle is removed, slip cut piece over stem and replace handle.

Now, valve handle cannot be turned. However, should need ever arise to close valve, handle can be quickly detached and sleeve removed.—*Leonard G. Davis, Assistant to Plant Engineer, Bireley's Div., General Foods Corp. Hollywood, Calif.*



Three-Leg Stands For Kettles

Supports we fabricated for our many kettles have proven to have these advantages in service:

1. Made of materials on hand in the machine shop, they were economically fabricated and easily made.

2. Since they are formed from pipe, supports are sanitary and readily cleaned, as are also the areas that are under the kettles.

3. Though sturdy and free from wobbles, they angle inwards from support band to floor—thus offer minimum interference with operator movements around kettles.

Legs of stand are anchored at six equidistant locations on circumference of support band and are attached by either of the following two methods.

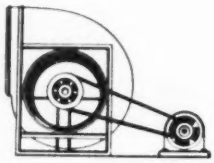
Bent at a sharp right angle at the upper extremity, legs—(1) in photo—may be welded directly to the rim, angled so that feet of two legs meet for welding to a common steel-plate base (2).

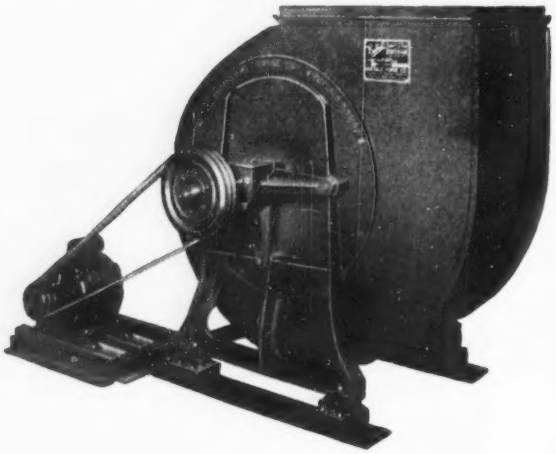
Second way to attach legs is to weld nipples (3) to band, thread elbows onto these, and then thread lengths of pipe which serves as legs into the elbows.—*D. Bradshaw, Plant Engineer, H. A. Johnson Co, Boston.*

"Buffalo" *Tips on Getting the Best Service from your* **Fans**

MAKING THE RIGHT SELECTION

AXIAL FLOW? or CENTRIFUGAL?





Centrifugal fans like this "Buffalo" Limit-Load model are generally the first choice for large ventilation, exhaust and air conditioning systems. Their efficiency is high even when installation is at a curve in the duct. Medium speed fans, they are ideal for handling large volumes of air quietly at medium pressures. "Buffalo" Limit-Load Fans have the additional advantage of being non-overloading, regardless of the system pressure. For further factors in the selection of a centrifugal fan, write for Bulletin 3737.

"Buffalo" BUILDS BOTH TYPES—

Axial Flows, on the other hand, move air by the propeller principle, straight through the fan housing. These fans will thus be most efficient mounted in straight runs of duct. They are ideal for light-duty ventilation and air conditioning service at pressures to around 2". Axial Flows are higher velocity fans than centrifugals, are lighter weight and more compact than centrifugal fans, therefore lower cost for duct-mounting on ceilings, walls, etc. However, the performance curve is often the last analysis in your choice of fan for each job. "Buffalo" Bulletin 3533-C contains a comparison performance chart of both "Buffalo" Limit-Load Fans and Axial Flows. A copy will be mailed to you on

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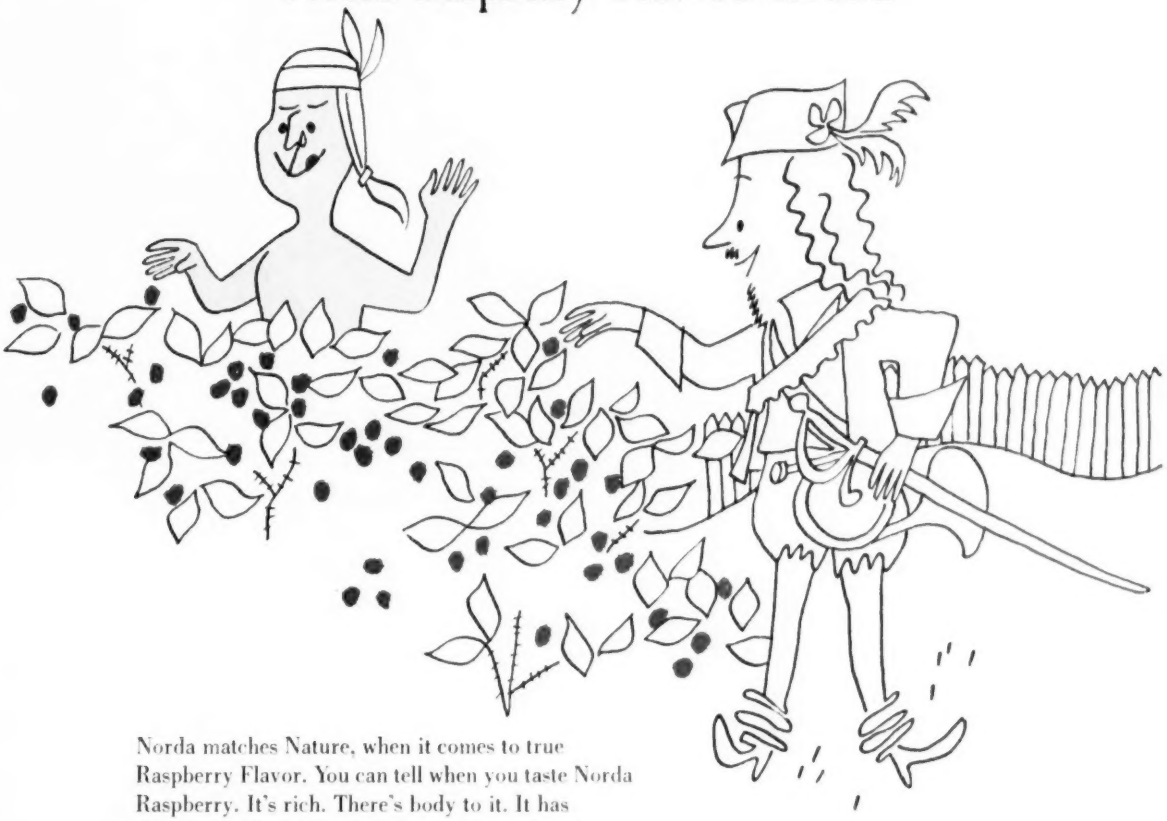
It's said that in 1696,
The Raspberry first was found;
People seem a lot happier now:
Norda Raspberry Flavor's around



Norda matches Nature, when it comes to true Raspberry Flavor. You can tell when you taste Norda Raspberry. It's rich. There's body to it. It has the same real raspberry character that makes the fresh fruit so fine.

Norda makes both genuine natural and imitation red and black raspberry flavors. They have the characteristics of the actual fruit. Their concentrated richness is true-to-life. Their strength saves money for you.

Improve the quality, aroma, tastiness, and popularity of your ices, gelatins, fondants, syrups, and mixes by using Norda Raspberry Flavor. See how much you will improve them by testing and tasting the generous free samples we hope you will send for *today*.

Use "A Favorite to Flavor It"... A Norda Flavor

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DYNALOG RECORDERS and DYNATHERM BULBS

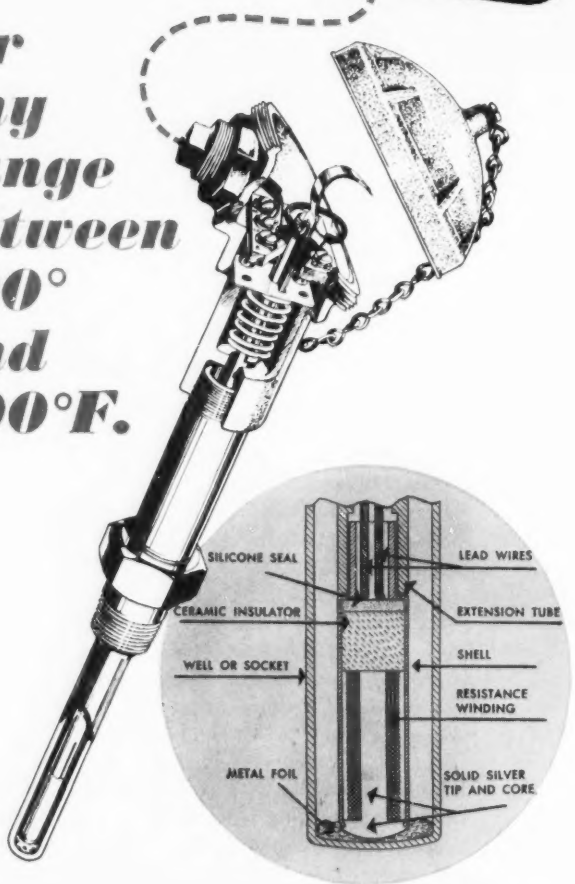
You can't beat this Foxboro Dynalog-Dynatherm combination for insuring better temperature measurement on any job between −100° and +600° F. It gives you every advantage of speed, accuracy, long leads, simple installation, economy, and freedom from maintenance. This is why:

The Dynalog Electronic Recorder has an exclusive variable-capacitor measuring system which eliminates slidewires, gears, cables, high speed balancing motors . . . no dead space, no batteries to standardize, no motors to service. Standard full-scale pen speed only 3 seconds. Sustained accuracy ¼ of 1% guaranteed. Available for spans as narrow as 5°F. with full-accuracy calibration.

The Dynatherm Resistance Bulb has unique features including metal-to-metal end-contact which, when installed in a well or socket, gives a speed of response unsurpassed by any other similarly protected temperature-sensitive element. Exceptionally rugged and permanent in calibration.

These are only a few of the important advantages of this better temperature measuring system . . . available also for control of temperatures, or with Multi-Record Dynalog Recorder for up-to-6 records on one chart. Write for illustrated bulletins. The Foxboro Company, 303 Neponset Ave., Foxboro, Mass., U.S.A.

for any range between −100° and +600°F.



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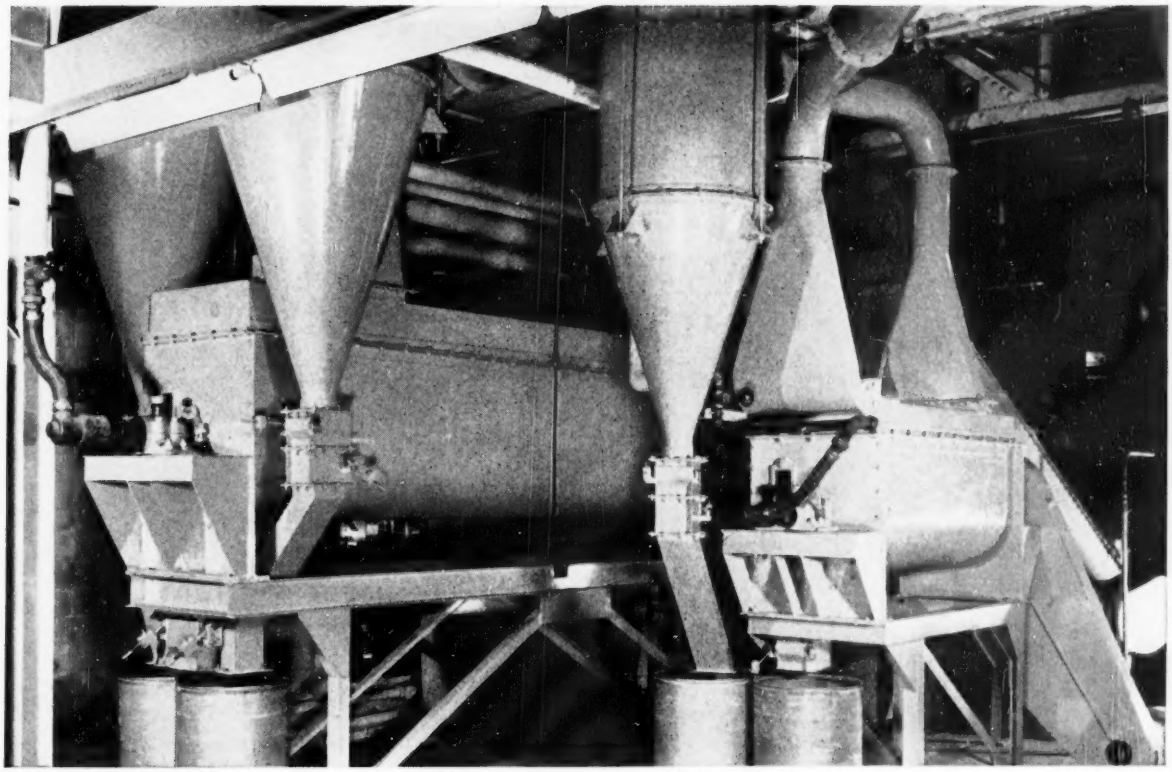

Midwest manufacturer saved enough in six months to pay for this two-unit Monotube installation. Solvents, formerly lost in processing, are recovered by drying.

Here's double assurance of the *correct* dryer for your process

ROTO-LOUVRE

Drum design provides aerated mass drying. Will not damage heat-sensitive materials. Gradual, positive heat transfer prevents case-hardening. Ask for Book 1911-B.

MULTI-LOUVRE

For rapid treatment of large quantities of material. Uniform, constant agitation promotes efficient, uniform drying with minimum degradation. Ask for Book 2409.

MONOTUBE DRYER

For small, inexpensive installations. Excellent for fine-particle materials. Minimizes dusting. Equally effective at high or low temperatures. Ask for Book 2413.

LINK-BELT builds 3 types ..offers free testing service

No single dryer can meet all processing conditions—or dry every kind of material. That's why Link-Belt builds three types of dryers—Roto-Louvre, Multi-Louvre and Monotube. Each has specific advantages . . . provides drying service that matches particular production processes. In addition, we offer a free laboratory analysis of your material. We'll test it by utilizing our laboratory facilities . . . work out procedures that can be duplicated in your plant. Ask for this **free** service today. Simply send samples of your material, a pound or a ton, or call the nearest Link-Belt office for further details.

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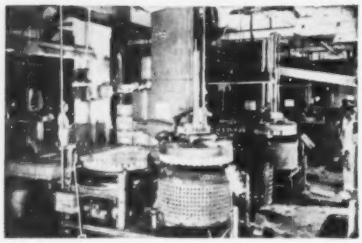
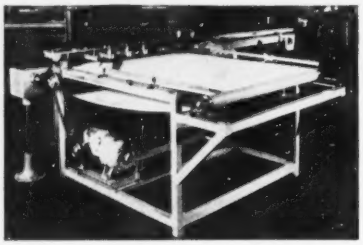
TIME and MONEY SAVING EQUIPMENT FOR THE FOOD PACKER

Three of our many installations, which have proven profitable to food packers, are illustrated and described below. These are offered as examples of the results of our work in collaboration with food packers and on specific problems. If you have similar or other problems in your plant it will pay you to talk to a Barnes' process engineer. There is no obligation for this service.



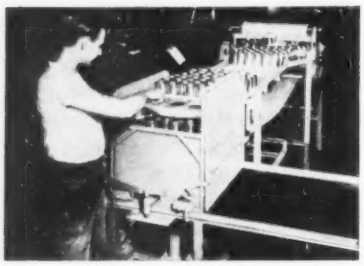
Load 500 Jars Per Minute

This Barnes retort crate loader handles 500 baby food jars per minute. It is one of many different machines designed and manufactured by Barnes to help the food packer lower costs, speed up handling, and minimize breakage.



Unscramble 500 Jars Per Minute with Barnes Single Filer

Here's a new, efficient method of unscrambling empty jars. The illustration shows operating end of machine where girls are positioned while dumping cases of glass onto the receiving conveyor belt. Jars are discharged to conveyor at the rate of 500 to 600 per minute, determined by size and shape.



Unload Over 600 Cans Per Minute with Barnes Packaged Can Unloader

This new dual purpose machine can be operated with only two men in continuous production while unloading 3 to 4 bags of cans per minute. The Barnes unloader handles 3 bags, each containing 265 No. 303 cans per minute, or 795 cans.

FREE ADDITIONAL DATA on these and other time and money savers for the food packer will be sent upon request. Write today. Ask for bulletin E353.

W. F. and JOHN BARNES

PROCESS EQUIPMENT DIVISION 310 SOUTH WATER STREET, ROCKFORD, ILLINOIS

Some Questions and Answers About the Martin Aseptic Canning System

Q. Exactly, what is the Martin Aseptic Canning System?

A. It is a system that provides a means of filling a sterile product into a sterile container, within a sterile atmosphere and closing it with a sterile lid.

Q. Is further processing of the product necessary?

A. No.

Q. Has the system been available for a long time?

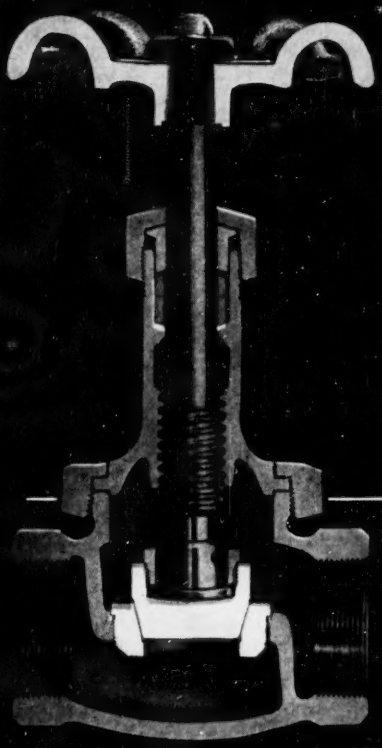
A. No. Although short-time high-temperature sterilization has been available or possible on many products for a good many years, it wasn't until the Martin System was developed that there was equipment available for Commercial exploitation of the advantages gained from short-time high-temperature sterilization.

Q. What does W. F. and John Barnes Co. have to do with the system?

A. They are sales representatives for the Martin Aseptic Canning System and offer engineering, technical and service assistance on the installation and operation of the equipment.

Q. Where can we obtain more information about the merits of this system?

A. By writing to W. F. and John Barnes Company, Process Equipment Division, 301 South Water Street, Rockford, Illinois. Ask for bulletin E353.



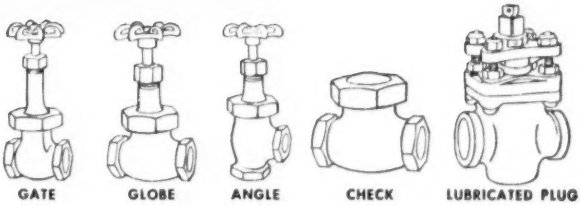
BRONZE

COMPLETE LINES OF BRONZE VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of types, pressure ratings, sizes, and patterns, including Walseal® Bronze Valves and Fittings for making Silbraz® joints.

Walworth also manufactures complete lines of valves and fittings — including Lubricated Plug Valves — made of steel, iron, and special alloys as well as bronze.

Walworth-made valves, pipe fittings, and pipe wrenches, total approximately 50,000 items—all sold through distributors in principal centers throughout the world.

Walworth engineers will be glad to help you with your problems. For full information call your local Walworth distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.



Bronze valves in gate, globe, angle, check, and lubricated plug types are manufactured by Walworth. Illustrated is a sectional view of a Walworth No. 225P Bronze Globe Valve. This valve has a working steam pressure rating of 350 psi at 550F (1,000 psi non-shock cold water, oil, and gas pressure). It features a renewable, plug type, stainless steel seat and disc, heat treated to 500 Brinell hardness.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Harnessing heat for all industry

HEAT is one of man's most useful servants. With it, he can separate gasoline from crude oil . . . cook food . . . generate electricity . . . refine steel from raw ore and roll it into mile-long sheets. But to do these and countless other jobs, heat must be applied in the correct amounts . . . to obtain critical temperature values.

Forward-looking research and production men realized some years ago that "rule of thumb" was entirely inadequate for replacing complex processes. They needed facts obtainable only from automatic measurement . . . performance possible only through automatic control.

Honeywell has consistently led the way toward new and better temperature instrumentation. Continuing research has developed sensing elements which cover the full temperature spectrum . . . instruments which provide the desired accuracy . . . and automatic controls which can regulate any production process.

instruments

The complete Honeywell family offers a broad choice of characteristics to suit individual applications. *ElectroniK* indicators, circular chart and strip chart recorders and controllers afford the peak in performance through "Continuous Balance" high-speed electronic measurement. *Pyr-O-Vane* millivoltmeter instruments fit many processes which need accurate indication and control. Brown Thermometers are economical instruments for recording and controlling moderate temperatures.

controls

With *Pyr-O-Vane* instruments you can have electric control of either the two-position, three-position or time-proportioning types.

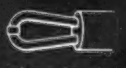
With Thermometers, you may choose from electric two-position, pneumatic on-off or proportioning control, and cam-operated program control.

With *ElectroniK* instruments, your selection covers practically any form of electric or pneumatic control, including the most advanced types suitable for complex processes, and the most flexible program controls.

New ways to cut —*through*

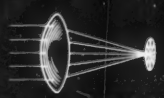
sensing elements

thermocouples



the most versatile of temperature elements, are supplied for ranges from −300 to +2800° F.

Radiamatic



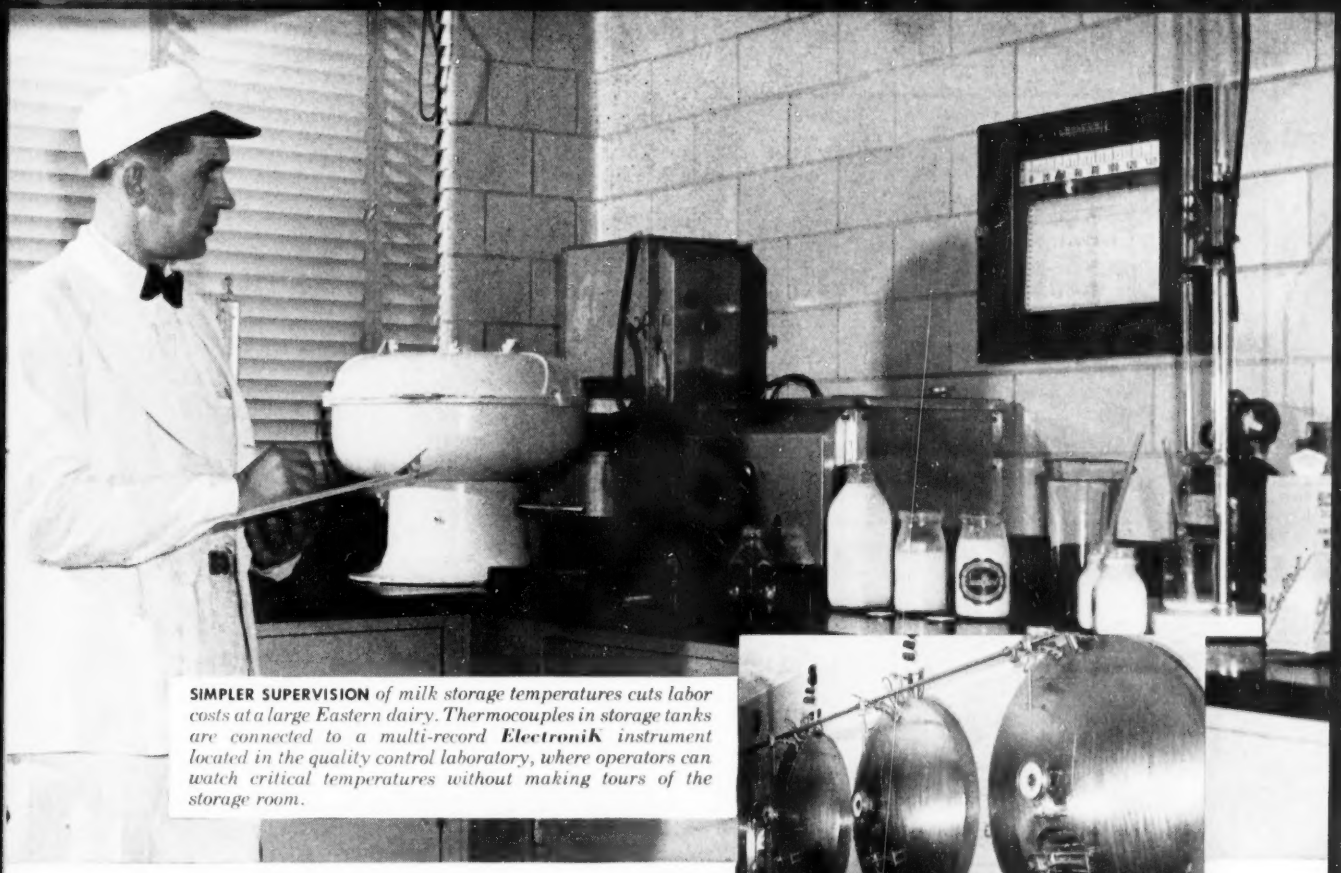
(radiation-type) elements are applicable to direct measurement of work temperature . . . to moving objects . . . to extremely high ranges and other jobs impossible for any other element.

resistance thermometers

are recommended for highest accuracy from sub-zero to 300° F. and for narrow spans.

thermometer bulbs

rugged, sensitive elements for moderate temperatures.



SIMPLER SUPERVISION *of milk storage temperatures cuts labor costs at a large Eastern dairy. Thermocouples in storage tanks are connected to a multi-record* ***ElectroniK*** *instrument located in the quality control laboratory, where operators can watch critical temperatures without making tours of the storage room.*

processing costs *Honeywell instrumentation*

PROGRESSIVE food plants are finding modern instrumentation by Honeywell a sure-fire means of holding the cost line. Almost invariably, these controls not only fulfill the cost-cutting job for which they were principally intended, but also produce related savings in maintenance, materials or labor.

Take the experience of a big Eastern dairy, as an example. By installing a multi-point *ElectroniK* temperature recorder, they brought all milk storage temperatures to one central point . . . eliminated hours of labor for checking and logging of individual storage tank temperatures. But savings didn't stop there. The sanitary thermocouples that work with the *ElectroniK* instrument greatly simplified tank cleaning . . . reduced maintenance and repair expense.

In scores of other plants, Honeywell instrumentation makes possible more efficient utilization of labor and equipment . . . reduction of product loss . . . non-stop operation at peak capacity. Your local Honeywell engineering representative will welcome the opportunity to discuss how your plant can realize these same benefits. Call him today . . . he is as near as your phone.

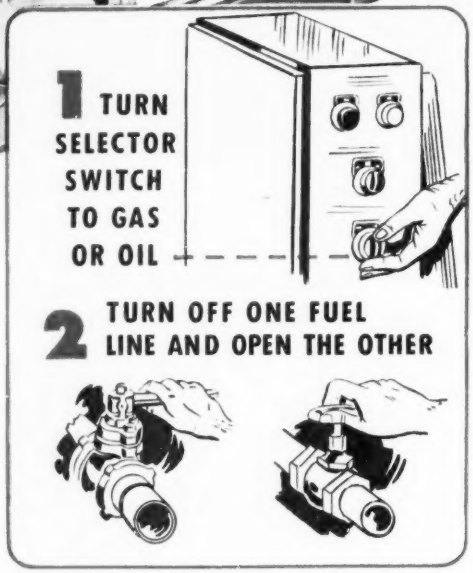
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4502 Wayne Ave., Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Composite Catalog No. 5000, and for Instrumentation Data Sheets on specific food industry applications.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

NOW... interchange Gas and Oil firing in *10 seconds*

Modern Cleaver-Brooks Model LR Steam Boiler Equipped with Exclusive Cleaver-Brooks "10-second conversion" Combination GAS and/or OIL Burner



TWO, simple motions eliminate time-consuming change-over

Now you can use oil or gas at the flick of a switch! This exclusive new Cleaver-Brooks development permits changeover from oil to gas or vice versa in only 10 seconds.

That's because the Cleaver-Brooks Combination Gas and/or Oil Fired Boiler operates on gas *with the oil burner in place*. Simply flipping a selector switch on the control panel to either gas *or* oil sets the proper circuit in action. Turning the convenient fuel supply valves completes the entire changeover — and in 10 seconds or less!

To gas users in all parts of the country — and in particular areas where local requirements demand immediate changeover — this exceptional fuel flexibility can be an important factor in determining your overall operating economy.

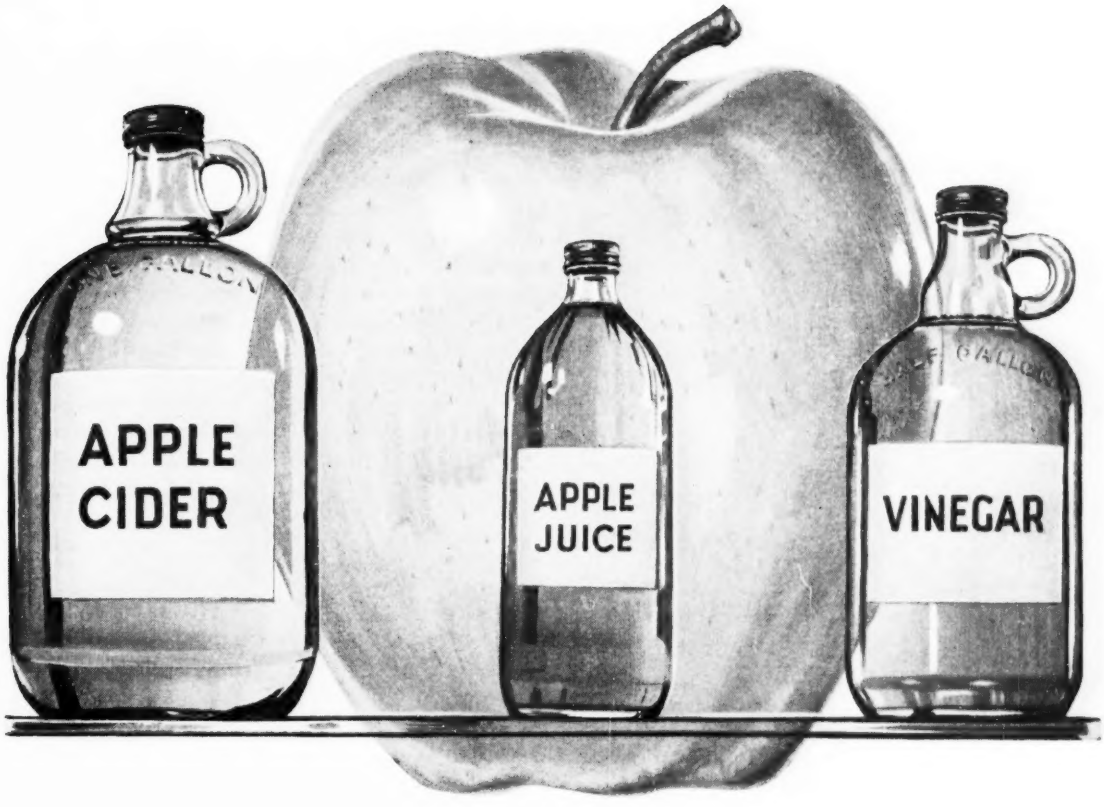
Ten-second conversion, like 4-pass construction, self-contained design, guaranteed 80% efficiency, is another "plus" feature pioneered by Cleaver-Brooks. It demonstrates Cleaver-Brooks' continuing effort to bring steam users even greater flexibility and reduced operating costs.

If you are considering simplifying your present boiler plant, remember Cleaver-Brooks Combination GAS and/or OIL Fired Boilers. Sizes 15 to 500 h.p. — 15 to 250 p.s.i. Write for complete facts.

Cleaver-Brooks

Originators of the Self-Contained Steam Boiler

CLEAVER-BROOKS COMPANY
Dept. C-355 E. Keefe Ave., Milwaukee 12, Wis., U.S.A.
Cable Address: Clebro-Milwaukeewis
Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners



How CELITE filtration gives apple products more eye-appeal, longer shelf-life

Celite* Filter Aids enable apple processors to secure brilliantly clear filtrates in their finished products. Celite provides such efficient filtration that it removes most material which promotes fermentation.

The result is a product with longer shelf-life, more eye-appeal—more "buy" appeal. Not only do Celite Filter Aids improve product quality, but they also permit high flow rates with long filtration cycles.

For maximum juice yield from your presses, a small amount of Celite should be used as a pressing aid. Celite Pressing Aids help produce a firm dry cake which can be easily and completely stripped from the cloth.

You are assured of highest product quality with Celite, for it is carefully processed from the purest deposits of diatomaceous earth. Celite is an extremely light weight, highly porous powder. It is chemically inert, insoluble, and specially treated so that it imparts no foreign flavor to fruits or foods.

To speed production and improve product quality, Celite is used in the processing of many foods and beverages such as sugar, fruits and juices, beer and wine. A Celite field engineer will gladly show you how Celite Filter and Pressing Aids can help your product or process. For his services simply write Johns-Manville, Box 60, New York 16, N.Y. In Canada, 199 Bay St., Toronto 1, Ontario.

*Reg. U.S. Pat. Off.

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville CELITE** FILTER AND PRESSING AIDS

For more information, use coupon on page 157.

It costs less to use this wholesome food emulsifier

Nine to four—that's the ratio of the monoglyceride content in Myverol® Distilled Monoglycerides to that of ordinary commercial monoglycerides for food use.

That means it takes less to create sales-stimulating texture in baked goods, margarine, dessert topping, peanut butter, and other food products.

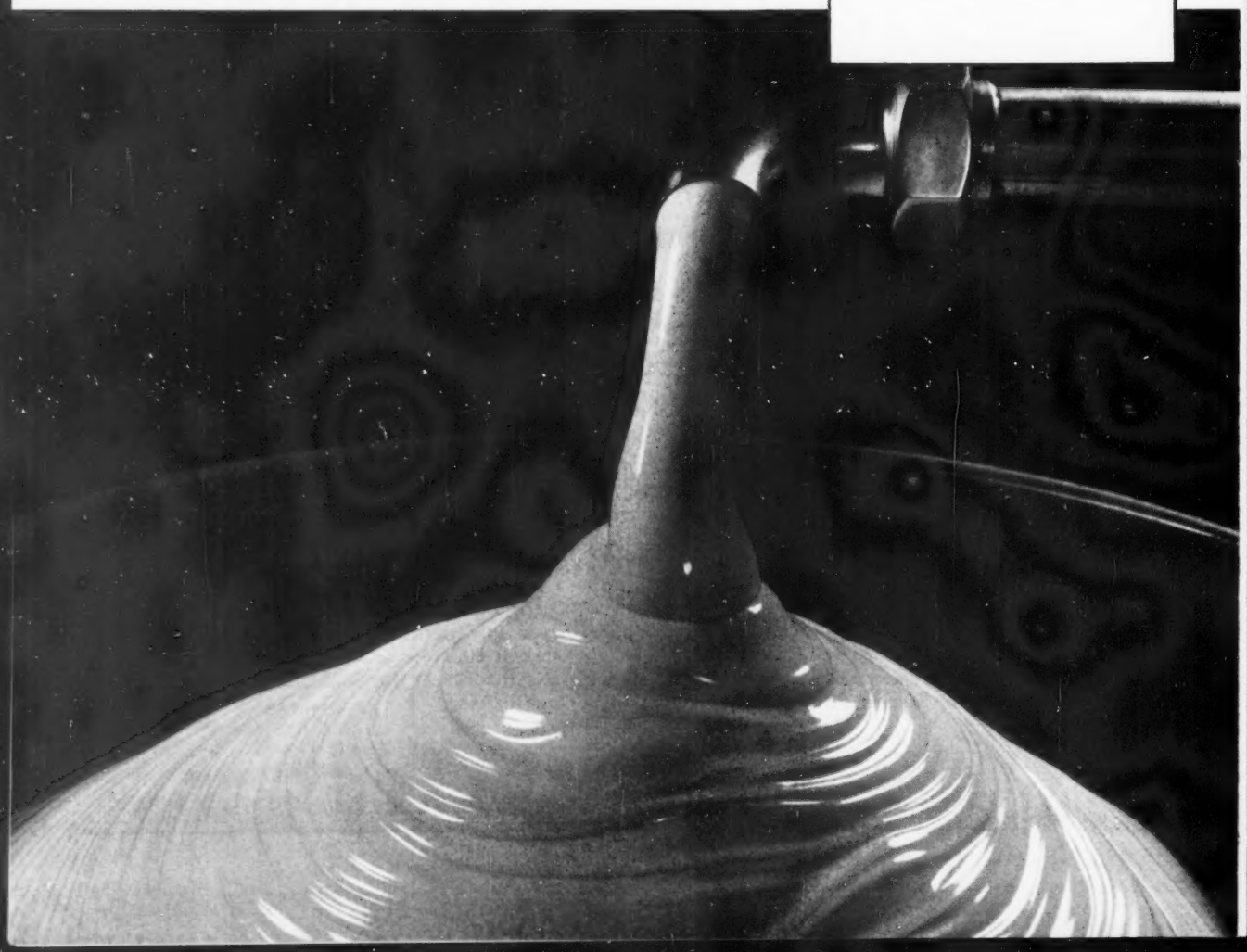
Myverol Distilled Monoglycerides, prepared from natural fats and oils, get their high efficiency from DPi's molecular distillation method, which concentrates them to a 90% monoester content, practically free of diglycerides and constituents that inhibit emulsifying or degrade taste.

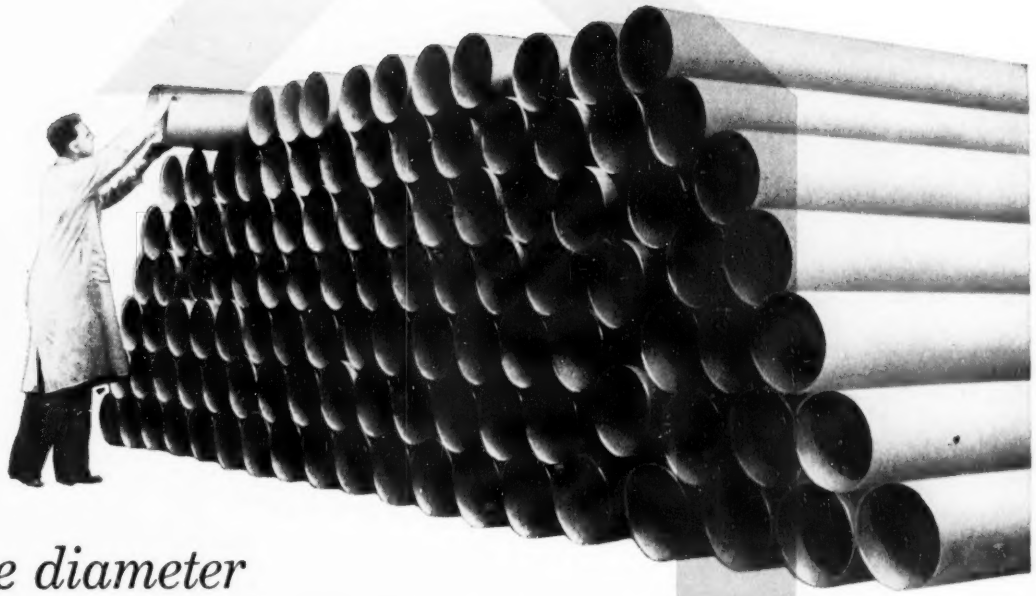
These wholesome products are homogenized with nitrogen to produce a smooth, white cream that blends easily in your mixes. Let us send you a sample for test. Just write, wire, or phone ***Distillation Products Industries,*** Rochester 3, N.Y. (Division of Eastman Kodak Company). Sales offices: New York and Chicago • W. M. Gillies and Company, Los Angeles and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides from natural fats and oils

Also . . . vitamins A and E

DPi



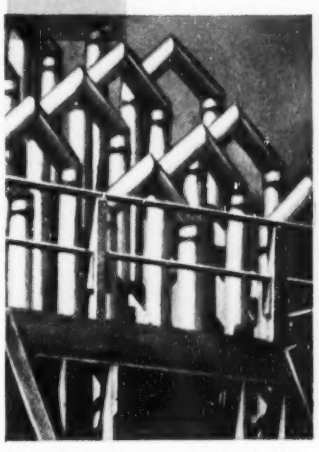


Large diameter

TRENTWELD STAINLESS TUBING

for your requirements

TRENTWELD Large Diameter Stainless Steel Tubing meets precisely the tubing requirements of fabricators, designers and manufacturers of processing equipment. Available in diameters of 4" to 40" OD, TRENTWELD is precision-finished with absolutely uniform section. TRENTWELD is furnished in any finish, for fabrication with any fittings you select. Call on us.



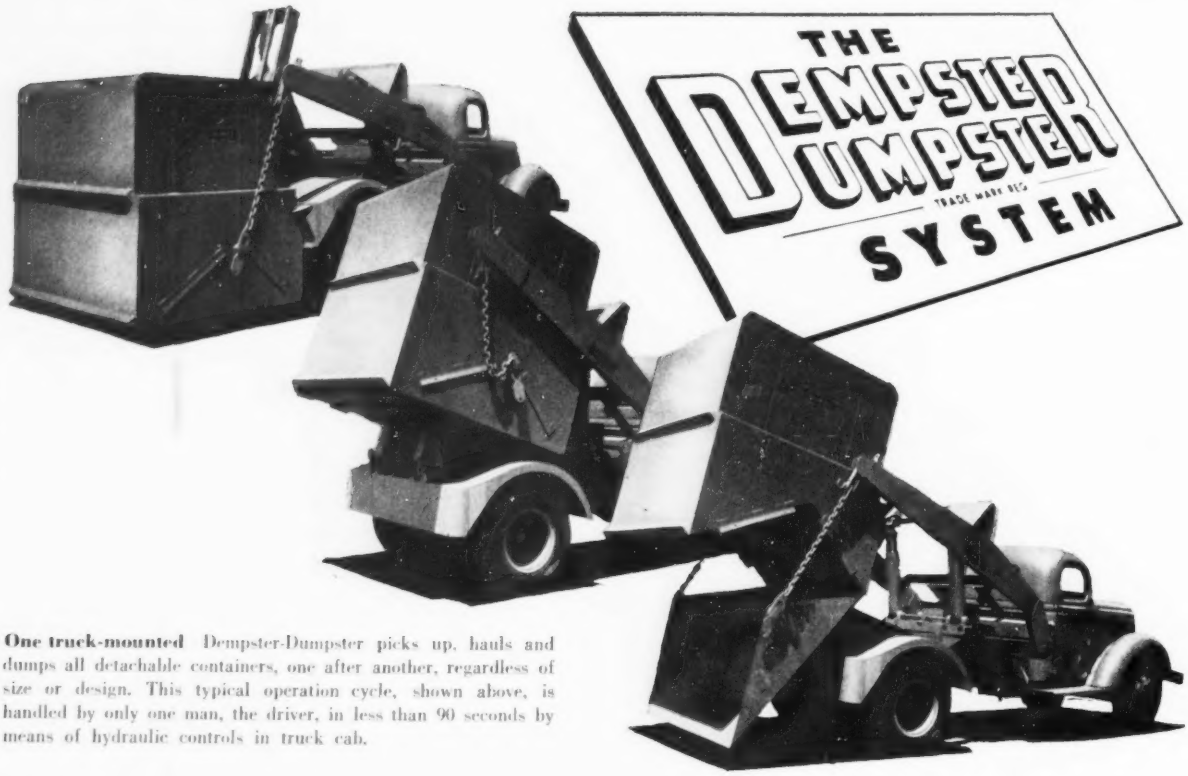
CONDENSING LOOPS FOR HANDLING MERCURY VAPOR AT A WESTERN MINE. FABRICATED OF CR-NI STAINLESS STEEL.

TRENTWELD

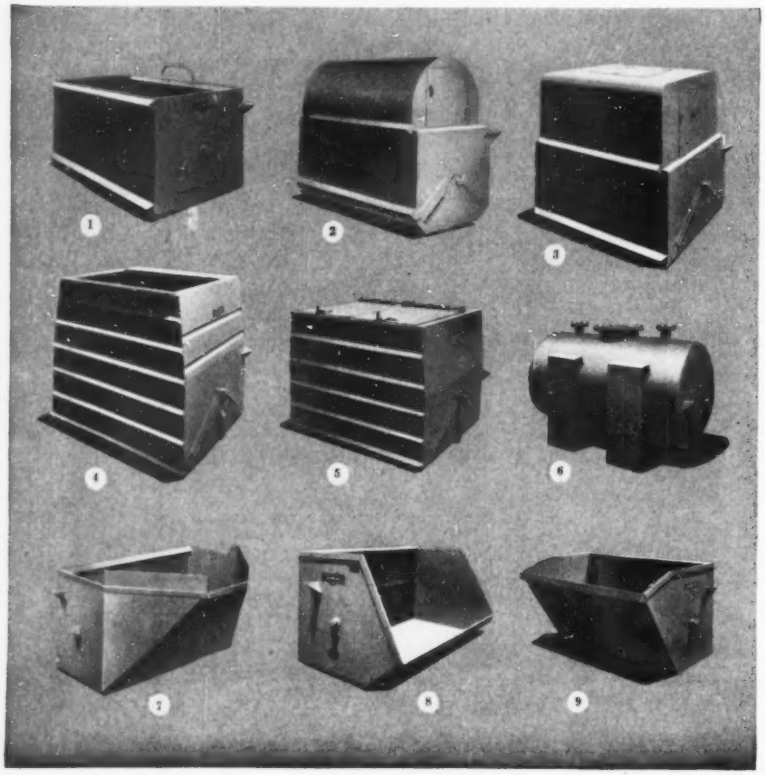
STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

For more information, use coupon on page 157.



One truck-mounted Dempster-Dumpster picks up, hauls and dumps all detachable containers, one after another, regardless of size or design. This typical operation cycle, shown above, is handled by only one man, the driver, in less than 90 seconds by means of hydraulic controls in truck cab.



1—Cuts Cost of Equipment and Operation— It is not unusual for one Dempster-Dumpster to perform the work of from 3 to 5 conventional trucks . . . reducing investment accordingly. Eliminating trucks also means eliminating tires, gas, oil, maintenance and man hours.

3—Eliminates Re-Handling of Materials — Re-handling of materials, which by conventional methods are hand loaded by loading crews into dump trucks, is eliminated. Each detachable container remains at its convenient location until loaded. Then, in less than a minute, it is picked up by Dempster-Dumpster and taken to destination. There it is dumped or set down intact . . . saving hundreds of man hours annually.

• • •

At left are a few standard containers for general requirements— 1—Drop Bottom Container built up to 10 cu. yd. capacity to handle heavy materials. 2—Apartment Type for bulk trash and rubbish with sump bottom for handling moist materials. 3—Universal Type available with top and end doors. 4—Drop Bottom Pressed Steel Type for lighter service. 5—Drop Bottom Pressed Steel Type with counterbalanced spring lids. 6—Tank Type Container meeting A.S.M.E. specifications. Capacities up to 1,200 gallons. 7—Tilt Type with Converged Lip for handling fine aggregate, wet or fluid materials. 8—Skip Type with Lip to assist in holding certain types of loaded materials in place. 9—Tilt Type for handling heavy materials. Built water-tight.

DEMPSTER BROTHERS,

For more information, use coupon on page 157.

MOST EFFICIENT METHOD OF MATERIALS HANDLING BY TRUCK EVER DEVISED

If you collect and move bulky, light or heavy materials in your plant operation . . . be they solid, liquid, dust, rubbish or waste, the Dempster-Dumpster System merits your careful consideration and investigation. This revolutionary method of bulk materials handling by truck can save you thousands of dollars annually!

The fundamental reason why the Dempster-Dumpster System is the most efficient method of materials handling by truck is because, in this system, one truck serves scores of detachable containers. In other words, a truck-mounted Dempster-Dumpster . . . with only one man, the driver . . . picks up, hauls, dumps or sets down intact . . . one after another . . . any required number of big Dempster-Dumpster Containers.

The hydraulically operated Dempster-Dumpster is mounted on any make truck chassis of suitable size.

The steel containers are available in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. They range in size up to more than three times the capacity of the average dump truck body. The containers are spotted inside and outside your plant at convenient materials accumulation points. A few of the dozens of detachable containers are shown here so that you may see the flexibility of this system in handling all types of materials in your plant with one truck. It may be that none of these containers will fit your own particular need. But remember there are Dempster-Dumpster Containers that will, either standard or special design.

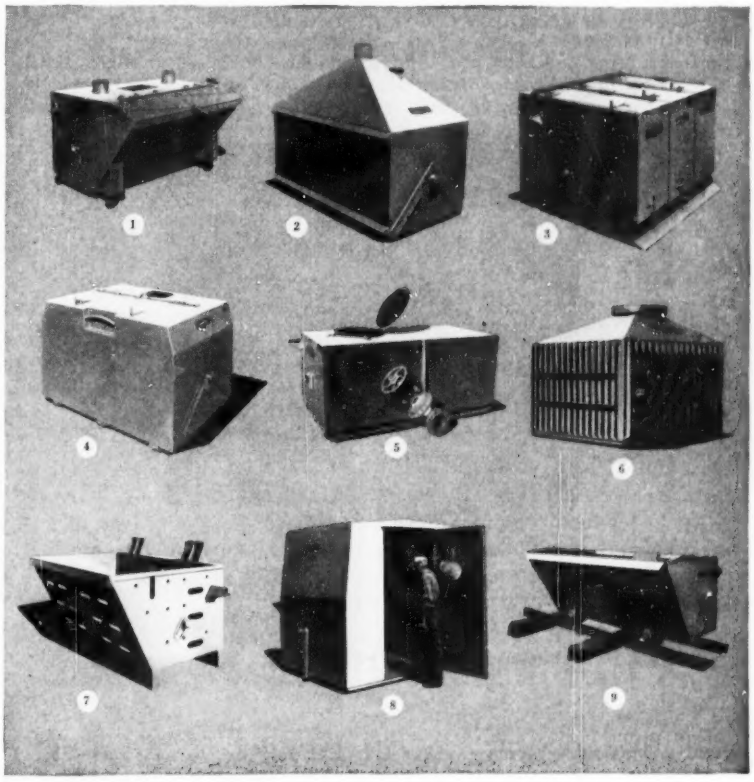
More efficient and lower cost materials handling in your plant may be simply a matter of getting the probing minds of your engineers and ours together. Our files contain hundreds of inquiring letters that ultimately resulted in savings of thousands of dollars annually in every conceivable type of manufacturing plant. A discussion with our engineers might develop the same results for you. If advisable, they will be glad to make, without obligation on your part, a proper survey to determine just what equipment you may need. The Dempster-Dumpster System is manufactured exclusively by Dempster Brothers, Inc.

2—Eliminates Standing Idle Time—One man, the truck driver, replaces truck loading crew. Detachable containers are pre-loaded through normal accumulation. Truck-mounted Dempster-Dumpster and driver never stand idle because there is always a pre-loaded detachable container to be serviced.

4—Increases Efficiency, Sanitation and Good "Housekeeping"—The Demp-Dumpster System is a complete, unified plan for area-wide materials handling. Materials to be disposed of or transferred are placed in a nearby container as they accumulate. Containers used for trash and rubbish are fire-proof, rat-proof and fly-proof. No other method of materials handling by truck can match the Dempster-Dumpster System in efficiency and low operating cost!

• • •

At right are a few containers built for special requirements— 1—Five cu. yd. container with swivel casters for handling waste blast sand. 2—Three cu. yd. Dust Collector Type equipped with gaskets. 3 Multi-Karry Container equipped with three 2 cu. yd. steel boxes with casters and lids. 4—Six cu. yd. drop bottom container with two spring-hinged lids and special loading opening in top. 5—Rectangular Tank Type Container with gate valve and gasketed Lid. 6—Chlorinator Ash Container designed for handling hot residue approximately 1500° F. 7—Tilt Type Container built for cast linings for handling hot materials. 8—One of several special "Tool and Equipment" Type Containers. 9—One of several types of special built containers equipped with ball bearing trucks.



733 Shea Bldg., Knoxville 17, Tennessee

For more information, use coupon on page 157.

here's why

they selected 4 different types of steam traps for 4 different applications

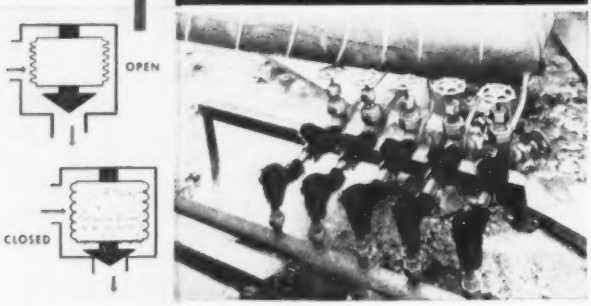
CONDITIONS under which steam traps must operate vary widely, but there is for every service one type that gives maximum efficiency.

Sarco makes the 4 distinctly different TYPES of steam traps shown below. Therefore, Sarco can give you *impartial* advice on the best choice for your particular installation.

For each of the 4 jobs listed below, the users selected four different TYPES of Sarco traps.

CASE NO. 1

Draining outside tracer lines in an oil refinery in New Jersey



Type of traps installed: Sarco No. 9 thermostatic traps.

Why selected: Being thermostatic, they are steam misers. Can't freeze, being wide open when cold. Easy to maintain since only the bellows moves. Small, light and easy to install. Self-adjusting for different pressures.

CASE NO. 2

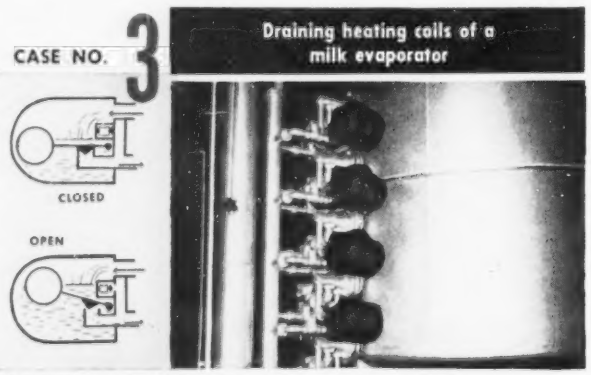
Draining platens of compression plastic presses

Type of traps installed: 100 Sarco Inverted Bucket traps in service for 17 years.

Why selected: Press platens have small horizontal steam spaces; the intermittent blast discharge of these Sarco traps scours the heating surface. Built-in strainer cuts maintenance costs.

CASE NO. 3

Draining heating coils of a milk evaporator

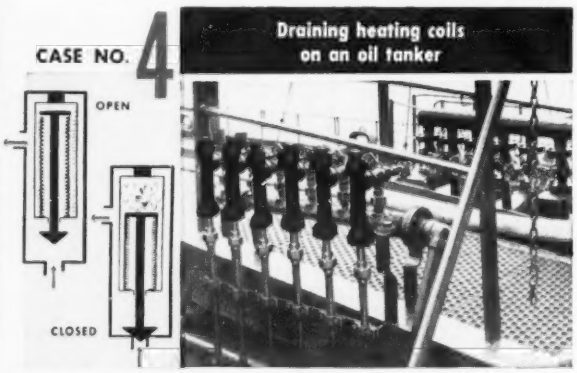


Type of trap installed: Sarco Float-Thermostatic Trap.

Why selected: Heating surfaces of the coils must be kept full of live steam—this Sarco trap discharges condensate as it collects. Can't airbind because the integral thermostatic vent gets rid of air, regardless of operating steam pressure and temperature. As shown in sketch 3 above, this vent does *not* depend upon the discharge of condensate.

CASE NO. 4

Draining heating coils on an oil tanker



Type of traps installed: Sarco LIQUID EXPANSION traps No. 871.

Why selected: Traps on tankers are exposed to freezing weather and vibration. Sarco's No. 871 traps can't freeze; resist vibration, water-hammer, pressure pulsations and superheat. These traps discharge condensate at adjustable temperatures below 212°F., permitting use of some of the condensate's sensible heat.

408

● Write today for Bulletin No. 145-A: *Selecting the Right TYPE Steam Trap.* Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. Represented in principal cities. Sarco Canada Ltd., Toronto 8, Ontario.

SARCO saves steam

improves product quality and output

For more information, use coupon on page 157.

Motorola 2-Way Radio

"... like working a double crew on each job!"

Uni-Channel Sensicon Dispatcher puts 2-way radio contact in every vehicle . . . takes jolts and shocks of rough terrain . . . cuts "dead" mileage . . . speeds operations.

MORE THAN PAYS FOR ITSELF

Motorola radio centralizes control of wide-spread crews . . . co-ordinates operations . . . cuts "down" time . . . reduces travel time . . . gets men and equipment to the job faster. These savings pay for Motorola installations over and over again.

Motorola radio is ruggedly built, quickly installed, easily operated—a *hard-working tool* for day-in, day-out utility.

Eight exclusive Motorola features guarantee precision selectivity . . . time-tested durability . . . obsolescence-proof design. Motorola puts 24 years of electronics leadership into every custom-tailored installation. Let a friendly Motorola engineer in your vicinity show you how Motorola 2-way radio can improve *your* business! Write to Dept. 2-86-EF.

Motorola®
Communications & Electronics, Inc.
A SUBSIDIARY OF MOTOROLA, INC.
900 N. Kilbourn Ave., Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada

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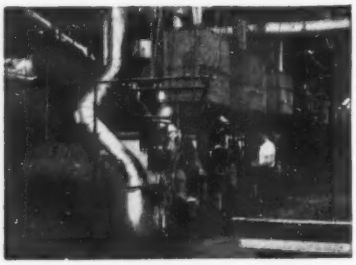
VOLUME food processing WITH GAS

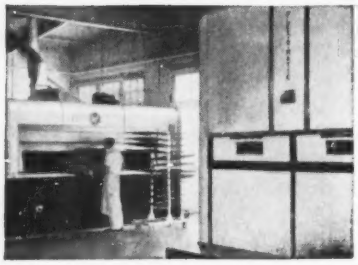


COFFEE ROASTING

Fast, uniform roasting is assured with this battery of 9 Gas-fired batch roasters, which has an annual output of 25,000,000 pounds. Gas does this job uniformly, economically and dependably.

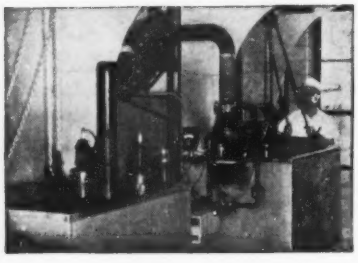
MEAT CURING

Gas burners char Hickory sawdust in this 3-story smoke house to generate aromatic smoke for curing and smoking of hams. Gas is the ideal fuel for food processing because Gas is clean, efficient, and affords precise temperature control.



VARIETY BAKING

Versatility of Gas and Modern Gas Equipment is evident in volume variety baking of rolls, breads, cakes, pies, etc. Precise, automatic temperature control for perfect baked goods is available with dependable Gas.

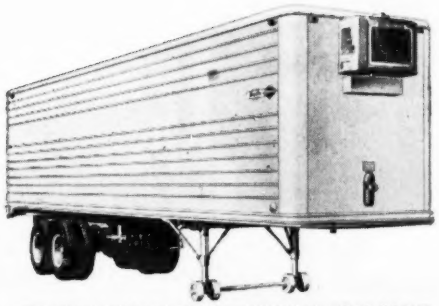


FOOD SPECIALTIES

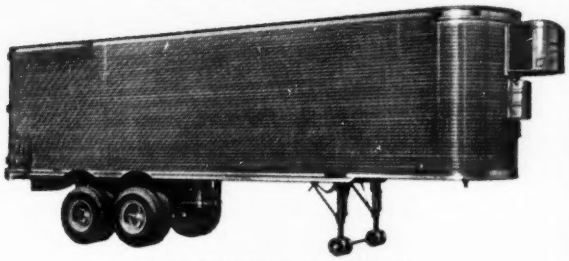
These immersion tank units used for blanching nuts are typical of the Modern Gas Equipment available for special food processing. Wherever heat is needed to process foodstuffs, you will find that Gas is the dependable, clean, economical fuel to use. Get the facts about GAS today, from your Gas Company Representative.

MORE AND MORE THE TREND IS TO GAS FOR BEST PROCESSING OF FOODS

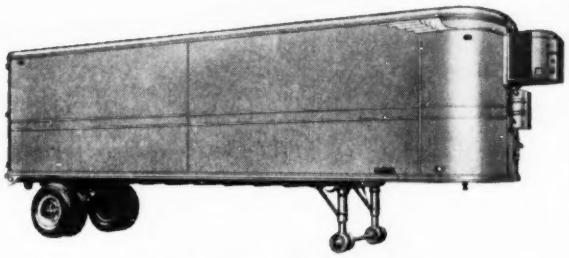
AMERICAN GAS ASSOCIATION • 420 LEXINGTON AVE., NEW YORK 17, N.Y.



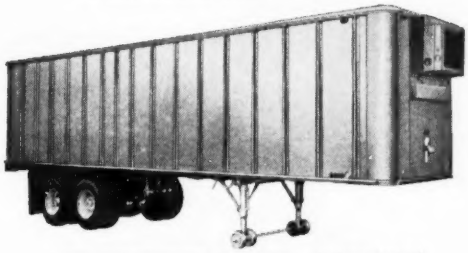
THE NEW SMOOTH-PANEL ALUMINUM ROAD★STAR



THE TOP-QUALITY ★STAINLESS★



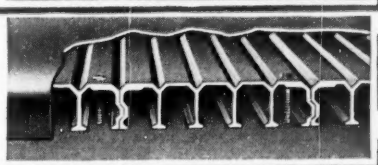
THE HIGH-TENSILE STEEL AERO★VAN



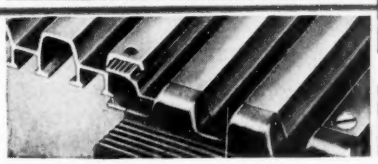
THE CORRUGATED ALUMINUM CAR★A★VAN

CORRUGATED STAINLESS STEEL "LIFETIME" FLOOR

WEIGHT-SAVING ALUMINUM "TUF-LITE" FLOOR



NEW, EXTRUDED ALUMINUM "DRY-DUCT" FLOOR



4 BIG FRUEHAUF REEFERS...

Built Exactly As You Need Them!

With a Choice of Floors and Insulation To Suit Every Kind of Refrigerated Haul!

ONLY FRUEHAUF offers you such a complete line-up of refrigerated vans, with an almost unlimited choice of options on over-all length, side door arrangements, insulation thickness, special reefer floors, meat rails, and refrigeration systems. Whether you prefer a rugged but lightweight aluminum unit or the top-quality, maintenance-saving Stainless Steel model, Fruehauf provides you with the finest, most durable Trailer construction available.

And you may have Fruehauf's lightweight, moisture-proof, bacteria-proof Ultralite glass fiber insulation in standard thicknesses of 3, 6, or 7½ inches, for maintaining *exact* temperature control as low as —10°. Fruehauf reefer doors are precision-built with double-sealing rubber gaskets and Ultralite insulation throughout for added temperature control.

See your Fruehauf salesman now for "economy-hauling with the *right reefer.*" And take advantage of convenient Fruehauf Trailer Service at Branch Factories from coast to coast!

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY

DETROIT 32, MICHIGAN

FRUEHAUF Trailers

"ENGINEERED TRANSPORTATION"

For more information, use coupon on page 157.

How to make a "pile" out of a hill of beans

● You don't have to come from Boston to enjoy or sell pork and beans, but you'll sell a lot more simply by making your sauce with MAGNA Spice Concentrols.

Pork-and-bean makers everywhere agree that MAGNA Spice Concentrols are easier to use, cut seasoning costs and impart a real old-fashioned goodness that brings folks back for more.

Contact your MM&R representative—the MAGNA man—or send a sample of your present crude spice seasoning to our Technical Research Laboratories. Let us show you how to make a pile out of a hill of beans.

M&R MAGNUS

Magnus, Mabee & Reynard, inc.

Since 1895 ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS

16 Desbrosses Street, New York 13, N. Y. · 221 North La Salle Street, Chicago 1, Illinois

Electronic spacer patterns guide stockpile through sequence of cuts automatically. Responsive Oilgear Transmission provides speedy travel with pin-point stopping within 3/1000ths of an inch from zero tolerance. Lawson Cutter also used in repetitive single cuts and for trim on sides. Photo in plant of Liedtke Brothers, Chicago.

The RESULT?

Accuracy just 900% better

Production increase 50 to 500%

Over and over and over again, Oilgear Fluid Power proves to be the right solution to a drive problem. Take the case of the Lawson Cutter.

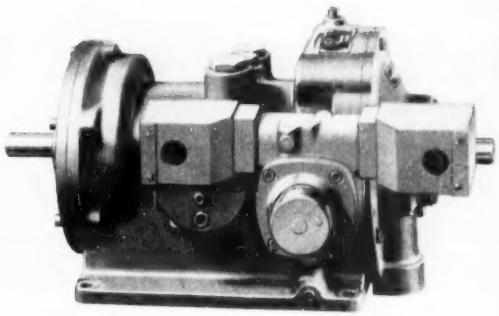
If precision is emphasized anywhere, that "where" is the field of fine color printing of every description. Money, time, effort are spent that art be right, that plates be right, that printing be right—to a hairline. And then comes the cutting operation where all that has gone before is saved—or wasted. Small wonder that cutting remained a hand operation for many years.

But the E. P. Lawson Company, manufacturer of cutting machines, wanted to modernize and mechanize the operation. Its designers turned to an electronic spacer device. This if anything would give precision in marking *where* to cut. But the next problem was to find a power drive capable of *obeying* the orders the electronic signal system was capable of *giving*. Lawson tried one type of drive. It varied all over the map. Lawson tried another type of drive. It was fairly accurate —but did not hold up.

Finally, as so many machine designers have done, Lawson turned to Oilgear. And there, as so many machine designers have done, Lawson found the answer to its problem.

The answer? Undeviating accuracy within 3/1000ths of an inch from zero tolerance—just 900% better than what had been achieved in the past; speed, translating into production increases of 50% to 500% month in and month out. How? Through the absolute responsiveness of Oilgear Fluid Power Drive to the automatic control system. Immediate, shockless acceleration to full speed "forward". Precise measured slowdown as the feed fence nears the target. Precision stopping "on target" for the cut and then rapid acceleration toward the next cut.

Here again is an example of the superlative "rightness" of Oilgear Fluid Power "generators," motors, transmissions—for almost any type of installation or machine requirement, big, little, and all those in between.



Oilgear Two way Variable Speed Transmission as used on Lawson Electronic Spacer Cutters. These drives also provide unlimited speed range from zero to maximum. Speed changes made in split second or specified time.

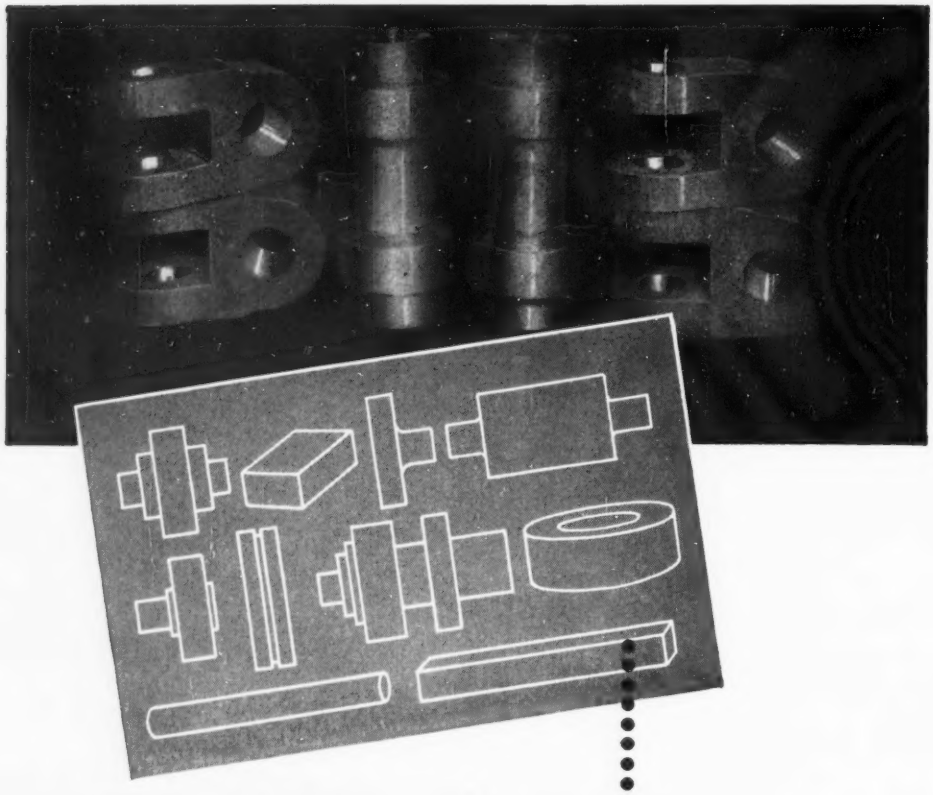
Chances are Oilgear is *the* solution you've been looking for. And Oilgear engineers will be just as quick to tell you if Oilgear is *not* for you. Ask for further information from an Oilgear Engineering Representative. No charge. No obligation. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

OILGEAR

OILGEAR

PIONEERS...NOW THREE PLANTS FOR FLUID POWER

PUMPS, MOTORS, TRANSMISSIONS, CYLINDERS & VALVES



Stainless Steel Forgings

to Your Specifications

RINGS...DISCS...BLOCKS...BARS...SHAFTS

SPINDLES...HUBS...SPECIAL SHAPES

Rough Machining
Heat Treating

We can supply clean, top-quality stainless forgings either "as is," or rough machined, heat treated, etc.

Any Allegheny Ludlum field representative will gladly give you further particulars, or write us direct.

ADDRESS DEPT. FI-39

Desired forgings in the available types of stainless and heat-resisting steels are produced in a wide range of shapes and sizes by our Forging and Casting Plant, noted for uniformly consistent properties and finish.

Experienced personnel, complete laboratory control facilities, excellent equipment and substantial capacity combine to assure quality and service.

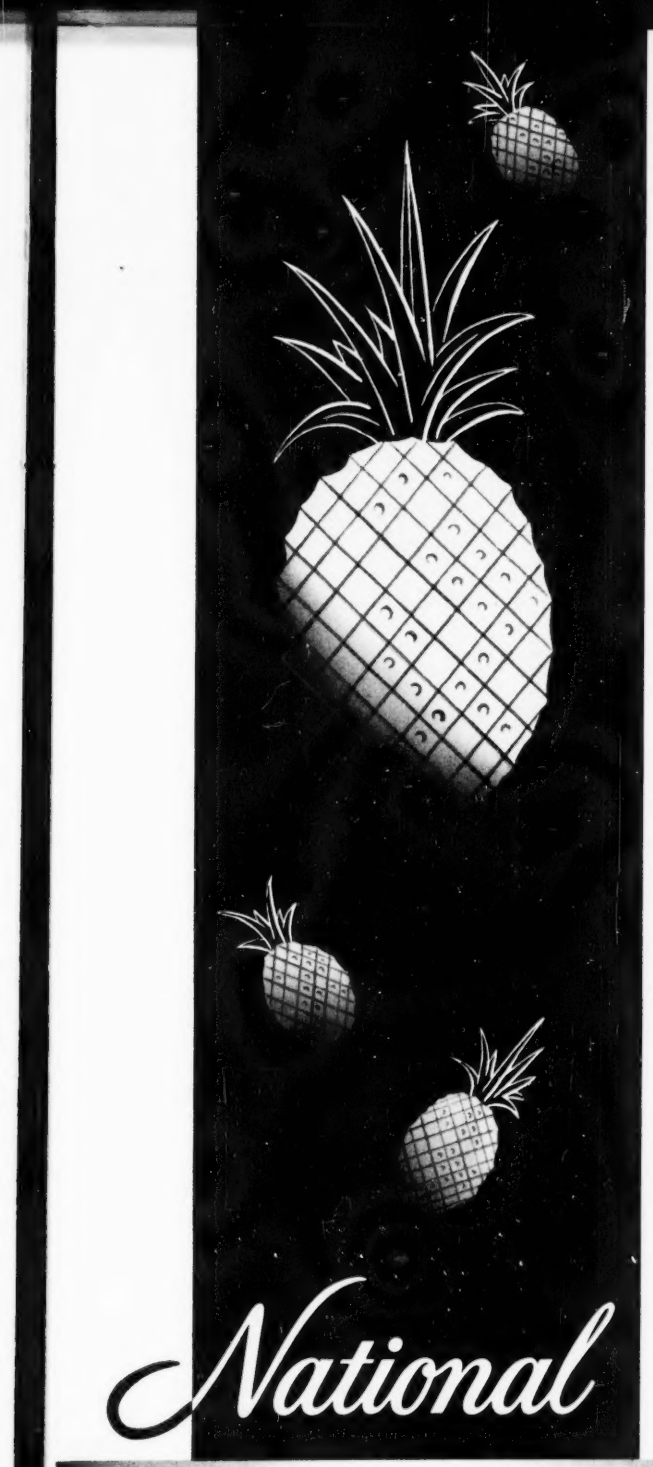
A-L offers assistance in grade selection, along with suggestions as to finishing and application—remembering the need for making the supply of stainless go farther and be of permanent value to our national productive economy. ● *Allegheny Ludlum Steel Corporation, Forging and Casting Division, Wanda & Jarvis Avenues. Detroit 20, Michigan.*

You can make it **BETTER** with

Allegheny Metal

W&D 8870

AL
TIME-TESTED STAINLESS STEEL



National

CERTIFIED

FOOD COLORS

KEEPING PACE WITH PROGRESS IN MODERN FOOD MANUFACTURING

Just as modern methods have standardized food processing and packaging, precise manufacturing-control has standardized the quality of National Certified Food Colors.

National has completely integrated production of certified food colors from basic raw materials to intermediates to finished colors . . . with precise control of chemical and physical properties at every step in the complicated manufacturing operations. No higher quality can be consistently maintained.

When you specify "National" you are assured of uniform pure-dye strength, brightness of shade and solubility . . . assured of uniformly appetizing color in finished goods, regardless of season or climate.

CERTIFIED COLOR DIVISION

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

Boston Philadelphia Chicago Charlotte
San Francisco Portland, Ore Toronto

Allied Chemical

Life Stream of Industry

BRINE

Now Yours Automatically Where You Want It —When You Want It

YOUR INDUSTRY, like so many others, very probably uses brine in its operation.

And now the LIXATE Process, pioneered and developed by the International Salt Company, takes all the complications, all the inaccuracies, all the costly handling out of brine making. You use rock salt—and gravity does all the work.

You just turn a valve and *instantly* you have brine where you need it, when you need it—automatically!

And because this pure brine is *always* 100% saturated, because it *always* contains exactly 2.65 pounds of salt per gallon, your brine measurements are *unfailingly* 100% accurate.

Hundreds of companies have saved thousands of dollars, have improved the quality of their products by installing the LIXATE Process. Let International's Industrial Division help *you*. Send the coupon below, today.

INTERNATIONAL SALT COMPANY, INC.
INDUSTRIAL DIVISION, Scranton 2, Pa.

I am interested in knowing what the *Lixate* Process can do for MY plant. Please have an International Industrial Engineer contact me as soon as possible. I understand there is no cost, no obligation.

FIRM NAME _____

ADDRESS _____

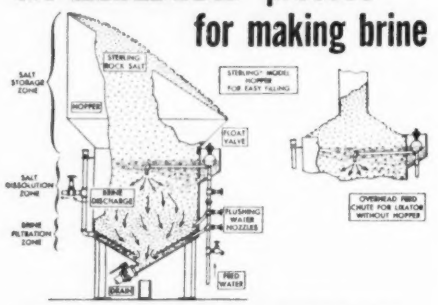
CITY _____ ZONE _____

STATE _____

MY NAME _____

MY TITLE _____

the **LIXATE*** process for making brine



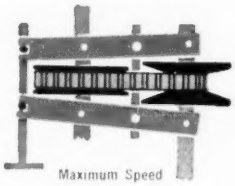
HOW LIXATOR WORKS

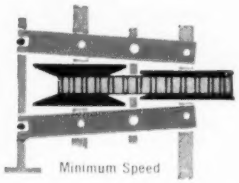
In the dissolution zone—flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone**—through use of the *self-filtration* principle *originated by International Salt Company*, the saturated brine is thoroughly filtered through a bed of *un*dissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

INTERNATIONAL SALT CO., INC.
SCRANTON, PENNSYLVANIA

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. New Orleans, La. • Boston, Mass. • St. Louis, Mo. Newark, N. J. • Buffalo, N. Y. • New York, N. Y. Cincinnati, O. • Philadelphia, Pa. • Pittsburgh, Pa. Richmond, Va. • ENGINEERING OFFICES: Atlanta, Ga. Chicago, Ill. • Buffalo, N. Y. *Reg. U. S. Pat. Off.

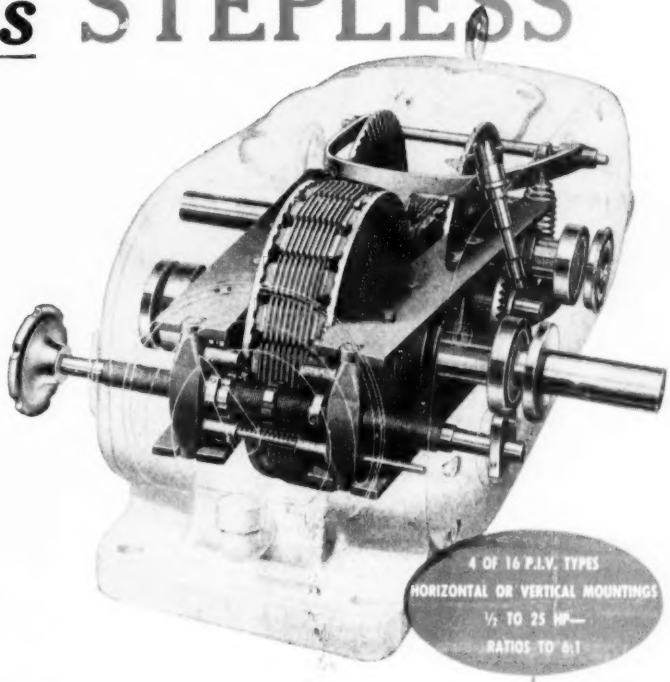
Always POSITIVE...
Always STEPLESS





Note how the effective diameter of P.I.V.'s wheels can be altered to change their ratio. You can select any point—from maximum to minimum setting—and get positive, accurately maintained speed.

ALL INDUSTRY USES P.I.V.*
*Positive, Infinitely Variable



P.I.V. Variable Speed Drive gives you infinite speed choices

SELECT ANY SPEED within normal operating range, and you can always be sure Link-Belt's P.I.V. Variable Speed Drive will maintain it accurately under full load conditions.

P.I.V. is not dependent on friction for power transmission. Self-tooth-forming chain meshes with grooved wheels to provide positive, infinitely variable speed selection. Using P.I.V., your machines are capable of working to maximum capacity according to the job. Control can be manual or automatic while running under full load.

Link-Belt's P.I.V. Variable Speed Drive is compact. It is particularly adapted to delicate or sensitive manufacturing processes that require exacting variable speed transmission. Find out how you can increase the flexibility and efficiency of your machines. Call your nearest Link-Belt office today for complete, detailed information. Send for Catalog No. 2274.

LINK-BELT
P.I.V. VARIABLE SPEED DRIVE

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,115

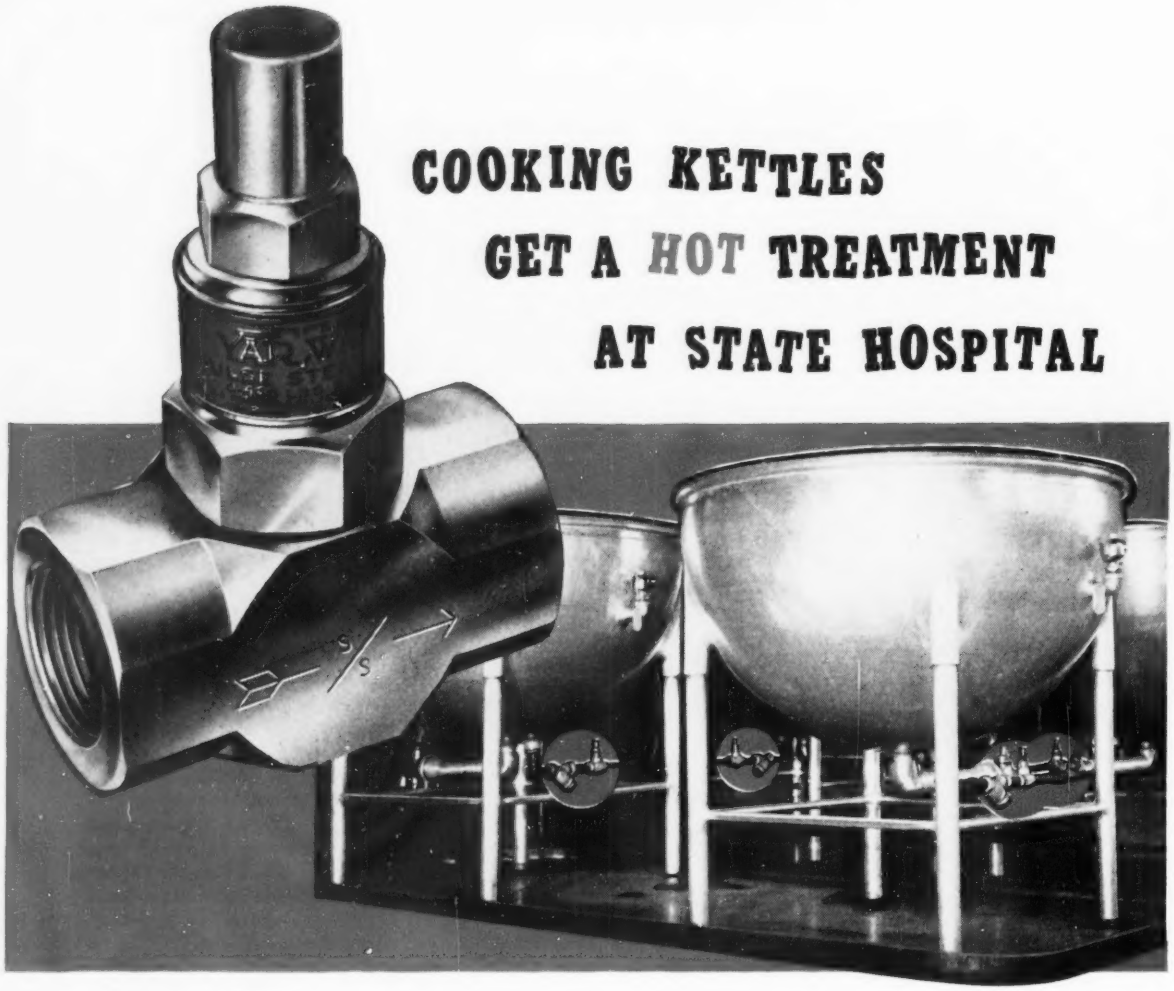
Basic, Positive, Infinitely Variable (P.I.V.) Speed Drive.

P.I.V. with single reduction input or output helical gears.

Motorized P.I.V. with single reduction input and output helical gears.

Motorized P.I.V. with single reduction input and double reduction output helical gears.

For more information, use coupon on page 157.



COOKING KETTLES GET A HOT TREATMENT AT STATE HOSPITAL

Yarway Impulse Steam Traps have put new life in many a "sick", sluggish cooking kettle. In fact, they are "good medicine" for the profitable operation of steam equipment of all kinds because they get equipment hot in a hurry and keep it hot!

At the installation pictured above, in the kitchen of North Carolina State Hospital, Yarways have been doing a good job for over 10 years. Besides quick heating and sustained efficiency, the plant engineer reports "little if any service required."

Other Yarway features are small size, easy installation, light weight, stainless steel construction, only one moving part, good for all pressures.

When you consider that new Yarway Impulse Traps often cost no more than repairing ordinary steam traps, it makes them a doubly good investment.

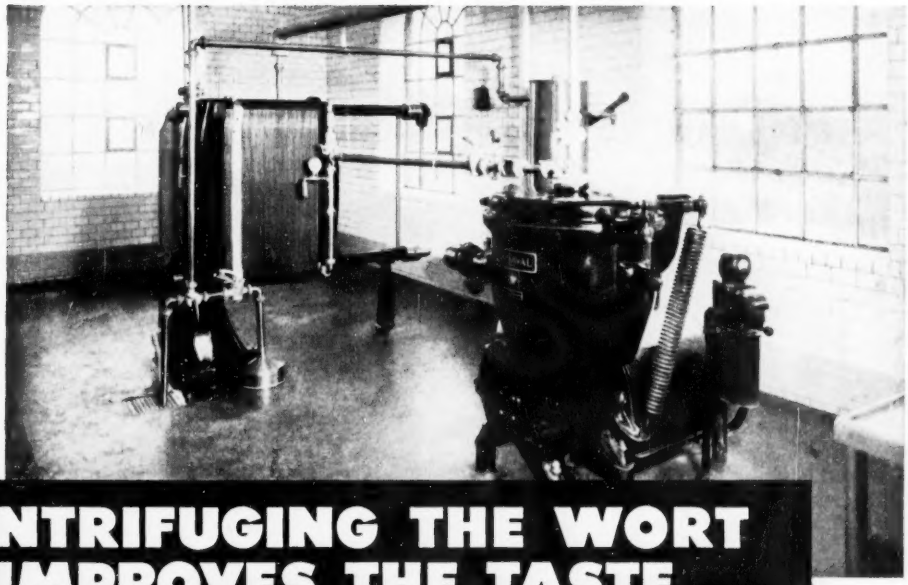
See the nearest of more than 200 Industrial Distributors who stock and sell Yarways. For free 20-page Trap Selector write . . .

YARNALL-WARING CO. • 127 Mermaid Avenue, Philadelphia 18, Pa.

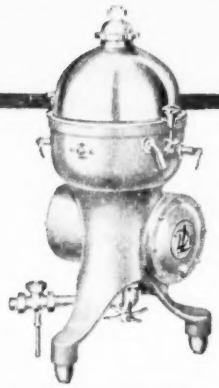
YARWAY

the steam trap designed with more production in mind

For more information, use coupon on page 157.



CENTRIFUGING THE WORT IMPROVES THE TASTE OF THE FINISHED BEER



DE LAVAL HERMETIC® BEER CLARIFIERS

A few of the advantages of using De Laval Centrifugal Beer Clarifiers in place of diatomaceous earth filters:

1. **No constant replacement of filter earth**
2. **Great savings in assembly and disassembly time**
3. **Sterile operation**
4. **Very little supervision required**
5. **Marked reduction in loss of beer**

De Laval Hermetic® Wort Clarifiers remove the trub that contains all harsh and bitter substances. By centrifuging these harsh resins from the hot wort, a cleaner-tasting, milder glass of beer is finally produced.

Centrifuging the hot wort not only produces hop flavor unequalled in mildness, but it helps produce a beer of unexcelled bouquet. Moreover, both foam and foam stability benefit when the hot wort is centrifuged.

In brewing beer, as in many other processes, not only is the act of separating speeded up and made continuous, but also the product is definitely improved. Whenever a job calls for continuous separation or clarification, De Laval centrifugals will usually do the work most effectively and often—as in this case—save enough to pay for themselves.

Investigate the possibilities in ***your*** plant.

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL

for CONTINUOUS Separation with Centrifugals

For more information, use coupon on page 157.

Huron field men and

technical service organization

are Best Qualified to help you

add more selling flavor

to your food products!

The use of Huron MSG in meat products and processed foods is increasing by leaps and bounds these last few years. The obvious reason for such rapid increase in the use of Huron MSG is recognition that it improves flavor appeal—sales appeal—DOES boost sales!

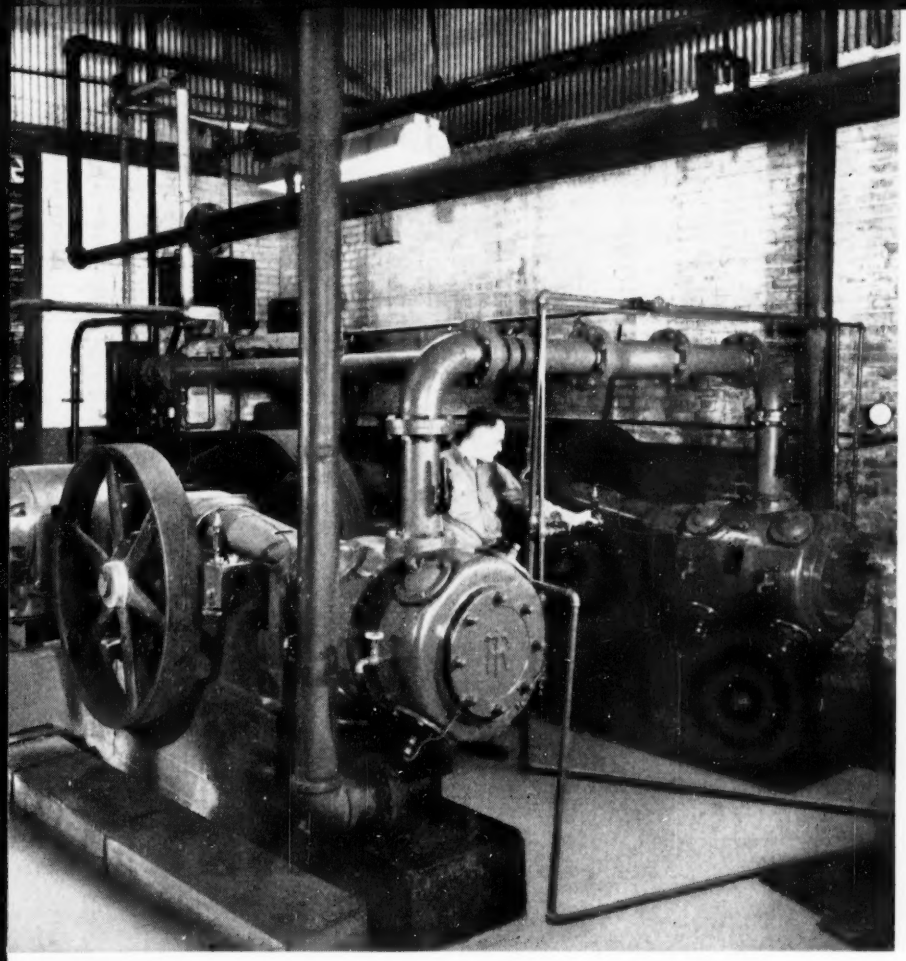
If there is any question in your mind on what Huron MSG can do for your food product—or about methods of use—simply drop a line to our Technical Service Department—or phone us. Working from conveniently located centers from coast to coast, Huron personnel is always alert to help to bring out more of the natural flavors in processed foods.

For FREE trial samples of Huron MSG or Huron HVP—and technical advice on use—simply write or phone—

THE HURON MILLING COMPANY • 9 PARK PLACE, N. Y. C. 7

Factories: Harbor Beach, Michigan

Sales Offices: 161 E. Grand Ave., Chicago 1 • 383 Brannon St., San Francisco 7 • 13 E. Eighth St., Cincinnati 2



Send for this booklet...

See what Stanoil offers you...

You'll find the means to significant savings in this booklet. It describes the important qualities of STANOIL Industrial Oil and the resultant benefits which have made this multi-purpose oil the choice of midwest manufacturers for a host of important lubricating jobs. Discover how STANOIL will give you superior protection through its unique combination of six outstanding characteristics, including high stability and effective rust prevention. Find how STANOIL can simplify stock, storage, and inventory in your plant by replacing special-purpose oils in hydraulic systems, speed reducers, air compressors, machine tools, electric motors, auxiliary turbines, and a wide variety of circulating, bath, and bearing systems. Ask the Standard Oil lubrication specialist from your nearby Standard Oil office for this booklet, or write: Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago.

Compressors give carbon the air

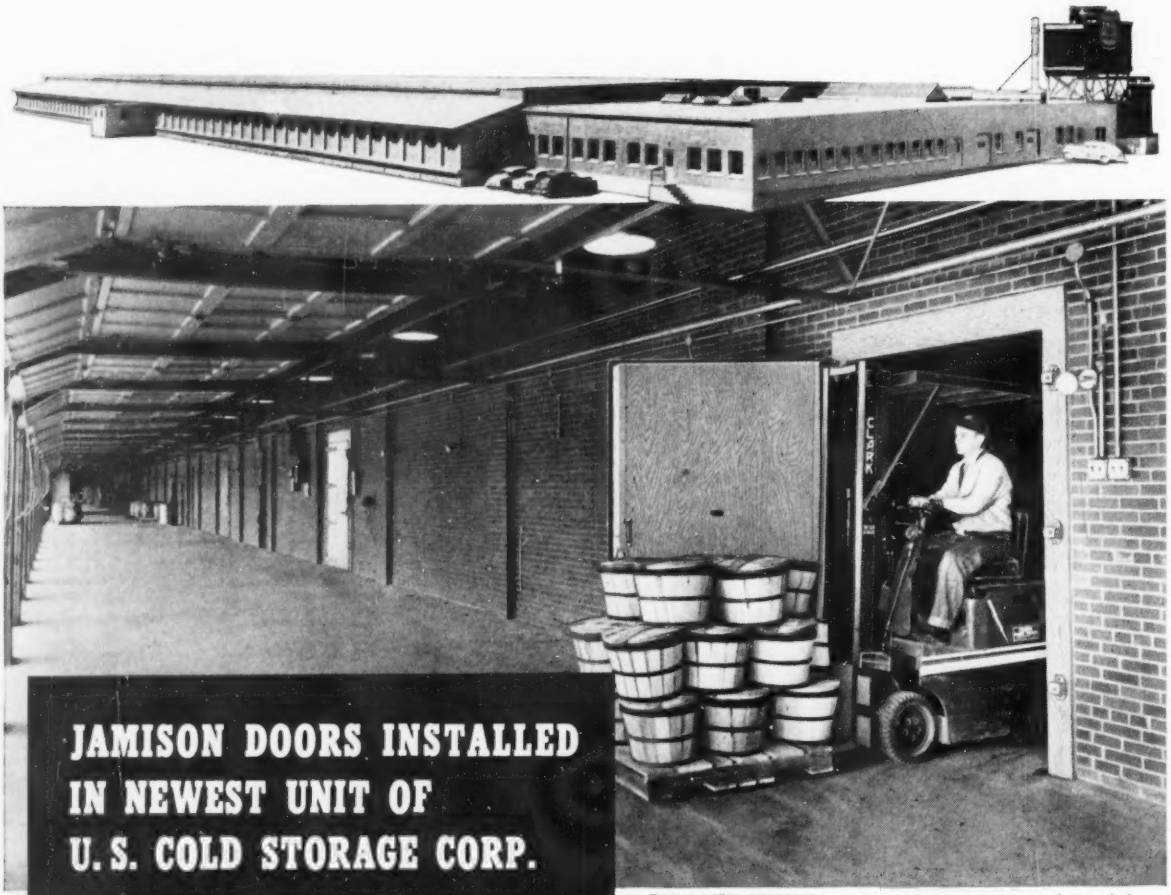
• When carbon formed on the valves of these air compressors and the oil in the crankcases had to be changed frequently, operators of this Midwest plant called in a Standard Oil lubrication specialist. He recommended STANOIL Industrial Oil, a multi-purpose oil having a low carbon-forming tendency and containing effective oxidation and corrosion inhibitors. With STANOIL, the compressors gave the air to carbon troubles and have breezed through four years of hard operation without difficulty. Over the oil previously used, STANOIL has given four times longer service in the crankcases. These results . . . similar to the results you may expect . . . have led to the use of STANOIL in other equipment in this plant.

STANOIL
TRADE MARK
Industrial Oil

Find how this multi-purpose oil can benefit you by discussing it with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office.

Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (STANDARD) *(Indiana)*



JAMISON DOORS INSTALLED IN NEWEST UNIT OF U. S. COLD STORAGE CORP.

FORK-LIFT TRUCKS permit rapid movement in and out of the cold storage rooms along this loading dock.

The U. S. Cold Storage Corp. has equipped its splendid new Omaha plant entirely with Jamison modern Series "50" Cooler and Freezer Doors. This new warehouse combines the latest in design, methods and equipment. It has 2,000,000 cubic feet of refrigerated space and a storage capacity of 25,000,000 pounds.

Jamison's exclusive hardware and rigid box-girder construction stand up under the heaviest punishment of electric truck operation. At this installation, the Series "50" doors meet a wide range of storage requirements. The 5-by-8-foot opening permits faster and easier handling by lift trucks.

There are 26 Jamison doors in the warehouse. Twenty-two open onto the loading dock with eleven on the track dock and eleven on the truck dock. Request Catalog No. 3 for details and specifications. Jamison Cold Storage Door Co., Hagerstown, Md., U. S. A.

THESE UNUSUALLY WIDE doors permit rapid movement of heavy loads by means of hand trucks as well as electric trucks.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

THE LEADER FOR OVER FIFTY YEARS

STRETCH OUT YOUR STAINLESS, TOO

There *are* ways to stretch out your supply of stainless.

For example, you may be using a grade or finish of stainless that is in extreme demand when another similar one, not as tight, could do the job adequately.

Our metallurgical staff and stainless fabricating specialists are ready to help you look into this matter and to advise you on more readily-available types of stainless that will do a satisfactory job. Feel free to call on us for this specialized help.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

STAINLESS STEEL

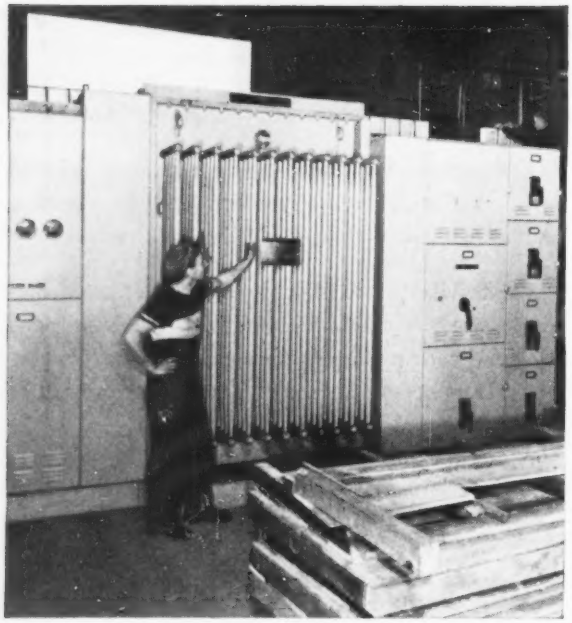
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REZISTAL STAINLESS • REX HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

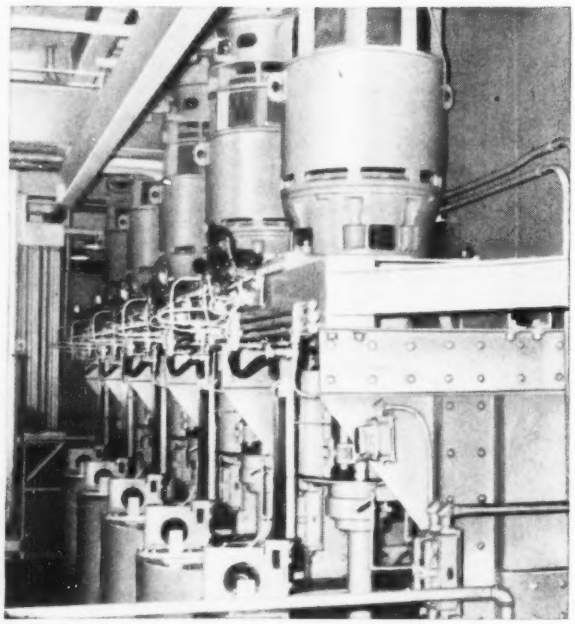
For more information, use coupon on page 157.

MASTER PLAN for National Sugar's new a-c power distribution system at Philadelphia was developed by this engineering team. Left to right: Frank LeCompte, Construction Engineer; Joseph Harrison, Electrical Engineer; Newton Smith, Plant Engineer; Lloyd Johnson, G-E Sales Engineer. Plan served as guide to flexible system that will simplify plant expansion.

Planned step-by-step modernization

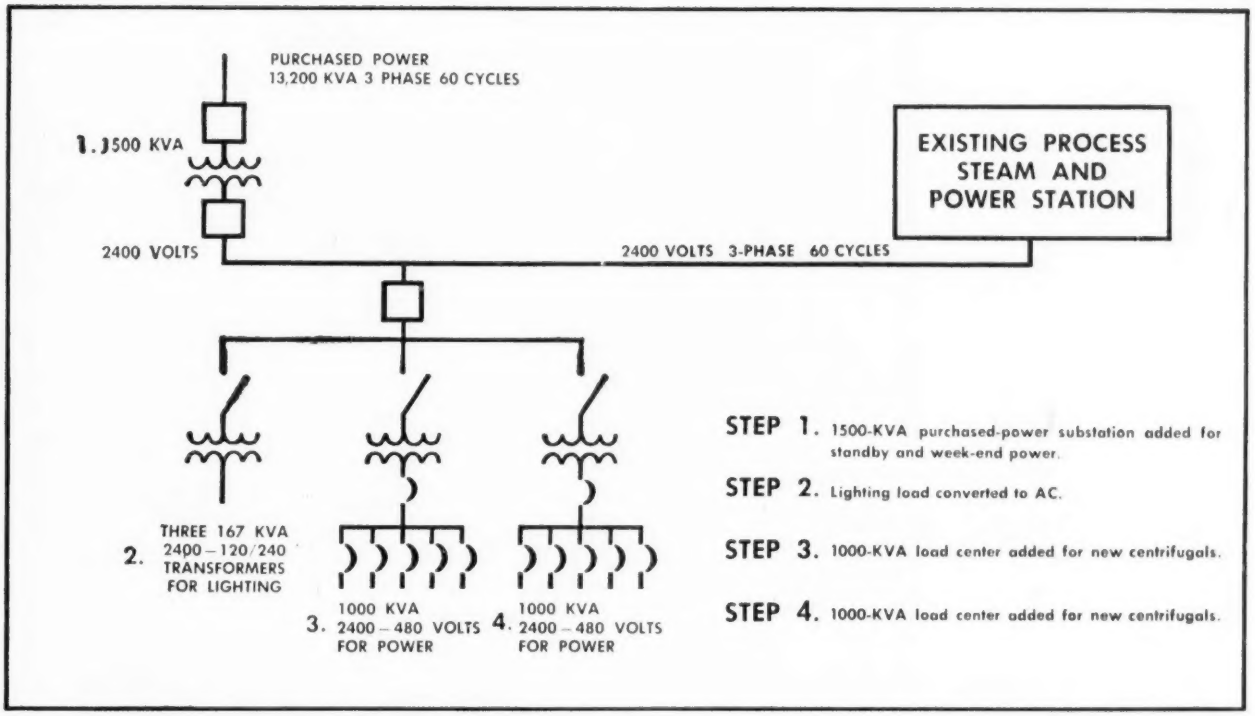


VOLTAGE IS STEPPED DOWN FOR CENTRIFUGALS by this G-E load-center substation. As future expansion takes place, others will be located in load areas throughout the plant.



MOTORS, CONTROL COST LESS—National Sugar's Pennsylvania Division modernized with automatic a-c driven centrifugals like these—cut installation costs, simplified controls.

For more information, use coupon on page 157.


PURCHASED POWER
13,200 KVA 3 PHASE 60 CYCLES
1. 1500 KVA
2400 VOLTS
EXISTING PROCESS STEAM AND POWER STATION
2400 VOLTS 3-PHASE 60 CYCLES
2. THREE 167 KVA 2400–120/240 TRANSFORMERS FOR LIGHTING
3. 1000 KVA 2400–480 VOLTS FOR POWER
4. 1000 KVA 2400–480 VOLTS FOR POWER
STEP 1. 1500-KVA purchased-power substation added for standby and week-end power.
STEP 2. Lighting load converted to AC.
STEP 3. 1000-KVA load center added for new centrifugals.
STEP 4. 1000-KVA load center added for new centrifugals.

SUGAR PRODUCTION WAS UNINTERRUPTED while the National Sugar Refining Company—producers of Jack Frost, Quaker, and Arbuckle's Sugar—carried out step-by-step power system expansion. Load-center substations, heart of new plan, make expansion easy—keep cost at minimum. Savings in cable, and a-c drives, have more than paid for system.

pays off at National Sugar Refining

Long-range system planning results in area-by-area modernization of both process and electrical systems at minimum investment

If your electrical distribution system can't take care of expanding production—and if complete modernization at one time would interfere with production and be uneconomical—then you'll be interested in the way the Pennsylvania Sugar Division of the National Sugar Refining Company solved this problem.

System *planning* was their key. G-E application engineers worked with Mr. Frank LeCompte, Construction & Development Engineer at National Sugar's Pennsylvania Division. Together, they designed a master a-c distribution system that was geared to the present system—and would accommodate future plant growth at minimum cost.

Then National Sugar put this master plan into action. The new a-c distribution system was purchased and installed section by section as processing facilities were modernized and expanded. This new system paid its way in savings in equipment, materials, and installation costs.

Reductions in original costs and capitalized operating expenses of ten new centrifugals, effected by using a-c instead of d-c drives, equalled the price of two new G-E load-center unit substations and several units of 2300-V switchgear. A 1500-KVA substation, operating from purchased power, quickly justified itself in meeting emergency standby requirements and in furnishing power on weekends.

General Electric application engineers can help you save the same way with a new power distribution system. Contact your nearby Apparatus Sales Office early in your planning. General Electric Co., Schenectady 5, N. Y. 652-13

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

Engineered Electrical Systems for Food Processing Plants

GENERAL ELECTRIC

For more information, use coupon on page 157.

When the FLAVOR is there -the Customers are too!

Magnify Natural Food Flavor as More and More Leading Food Processors Do . . . with Zest

Your brand will be their favorite if you use *Zest* to produce more satisfying, tastier products. This miracle seasoning—pure Monosodium Glutamate—intensifies natural flavor *already in* canned foods, without adding flavor, aroma or color of its own. Low cost *Zest* is effective in tiny amounts, added either before, during or after processing. Use it in canned soups, fish, stews, vegetables, meats, poultry . . . and scores of other foods. Boosting food flavor with *Zest* is a proven method of increasing volume sales in both canned and frozen foods. Write today for all the details about profit-making *Zest!*

Zest® -for food that tastes better, sells better!

Staley's 99+% Pure Monosodium Glutamate

A. E. Staley Mfg. Co., Decatur, Illinois

OTHER QUALITY STALEY PRODUCTS FOR FOOD PROCESSORS

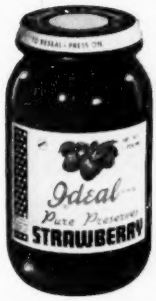
SWEETOSE®—enzyme-converted sweetener for firmer texture, better flavor

Sta-Sol®—lecithin concentrate gives more complete mixing, prolongs shelf life

Staley's C. S. U.—High quality standard corn syrup

For more information, use coupon on page 157.

How AMERICAN STORES CO. makes a fast-selling preserve

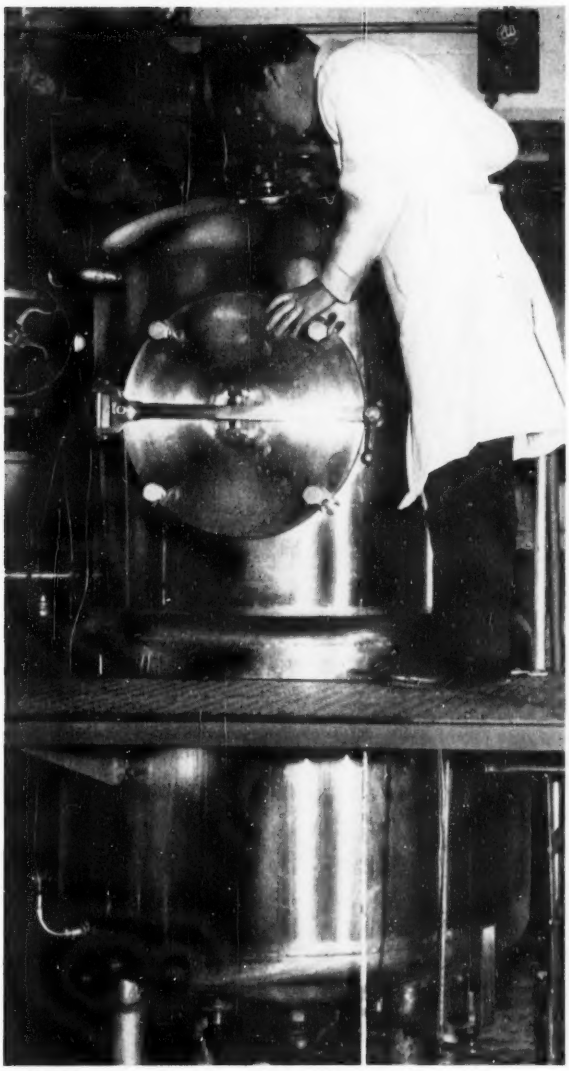


Repeat sales of Ideal Brand preserves don't just happen.

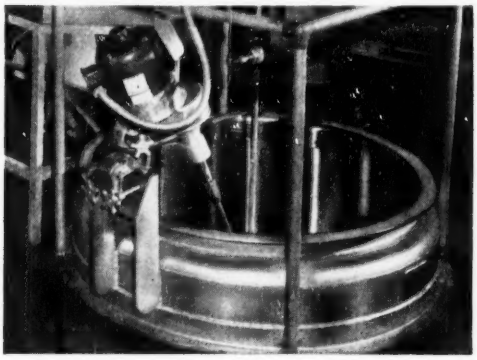
Ideal Brand has "rung the bell" of customer acceptance with a preserve that is easy to spread, full-flavored and consistently high in quality. Yet it is economical to produce.

American Stores Co. does it with a Pfaudler Stainless Steel Vacuum System. Sanitary and easy to operate, this system provides accurate control over the dispersal of fruit in the juice and traps the flavor into the preserve by evaporating water at lower than the normal boiling temperature. This prevents change in the natural qualities of the product caused by high temperature processing . . . assures a *true* fruit flavor.

If you want a product that will *easily* win customer acceptance, offer the easy-spreading firmness, fresh flavor and appetizing color of a preserve processed by a Pfaudler Vacuum System. Learn more about what this system can do for you now. Call your nearest Pfaudler office today.



PFAUDLER VACUUM PAN removes water without interference with natural flavor and other qualities of ingredients. Built to withstand the pressure of 100% vacuum, it is also equipped with a sampler to permit easy withdraw of samples.



PFAUDLER MIXING TANK thoroughly blends all ingredients before they go into the vacuum pan for final processing.

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK
Engineers and Fabricators of Food Processing Equipment

Gravity Fillers · Deaerators
Piston Fillers · Vacuum Pans
Steam Peelers · Evaporators

THE PFAUDLER CO.
Dept. FE-3, Rochester 3, N. Y.

Send me details on Pfaudler ☐ Vacuum Pan ☐ Mixing Tank

Name_____

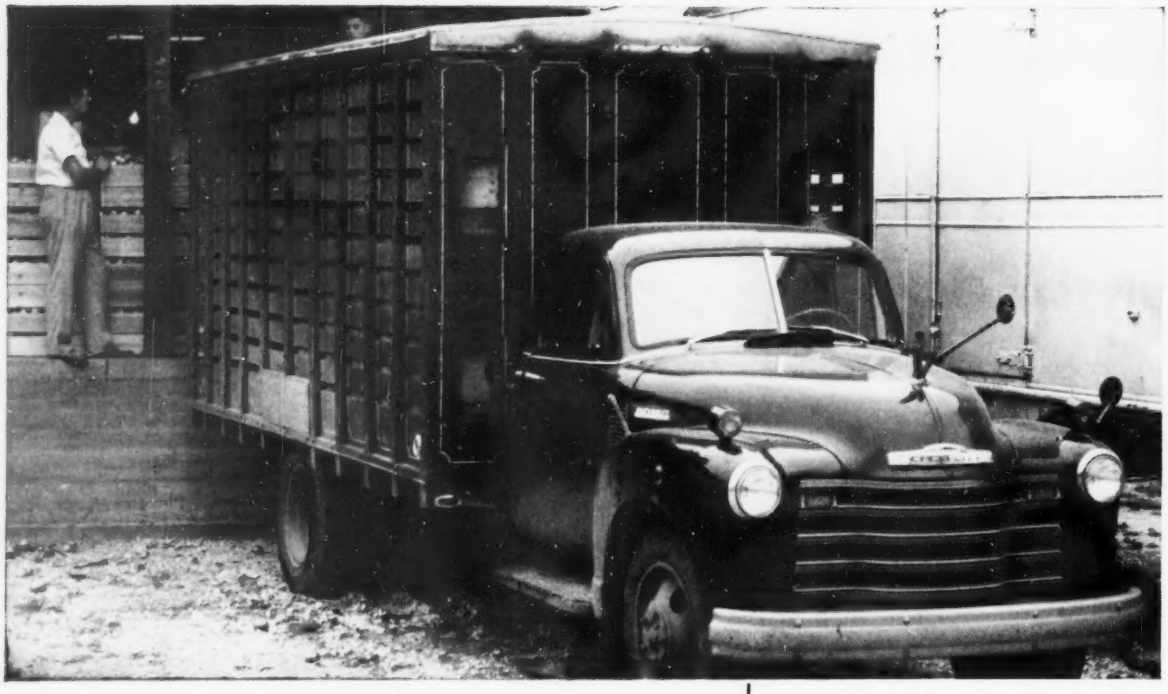
Title_____

Company_____

Address_____

City_____ Zone____ State_____

For more information, use coupon on page 157.



4 powerful reasons why 1953 CHEVROLET Advance-Design Trucks give you more of what you want

MORE POWER—GREATER ECONOMY! Expect a wonderful advance in power, performance and economy in Chevrolet heavy-duty trucks! The great 1953 Loadmaster engine—standard on 5000, 6000 Series, heavy-duty and forward control models, optional on 4000 Series heavy-duty trucks—has a new high compression ratio of 7.1 to 1, develops even more horsepower than before. And the Thriftmaster engine in light- and medium-duty models brings you traditional Chevrolet economy.

TRUCKS ENGINEERED FOR YOUR PAYLOADS! Chevrolet trucks are designed for the job they will do—engineered from tires to axle, springs, clutch and power plant to do that job with the greatest efficiency and lowest cost. You don't waste money on too heavy a truck or too light a truck. You buy the *right* truck for *your* job!

MORE STAMINA! More strength where strength counts most! In 1953, all Chevrolet trucks have stronger, brawnier, more rigid frames. They have heavier, sturdier construction that means a longer, lower-cost life for your truck. And they have new larger, safer, longer lasting brakes on many models, too!

GREAT TRUCK FEATURES! In addition to the many *NEW* things you'll find in these 1953 Chevrolet trucks, you'll also find many great features yet unmatched by other makes of trucks. Features such as Flexi-Mounted Cabs, Unit-Designed Bodies, Ball-Gear Steering and many others help make Chevrolet Advance-Design trucks your greatest buy. Chevrolet Division of General Motors, Detroit 2, Michigan.

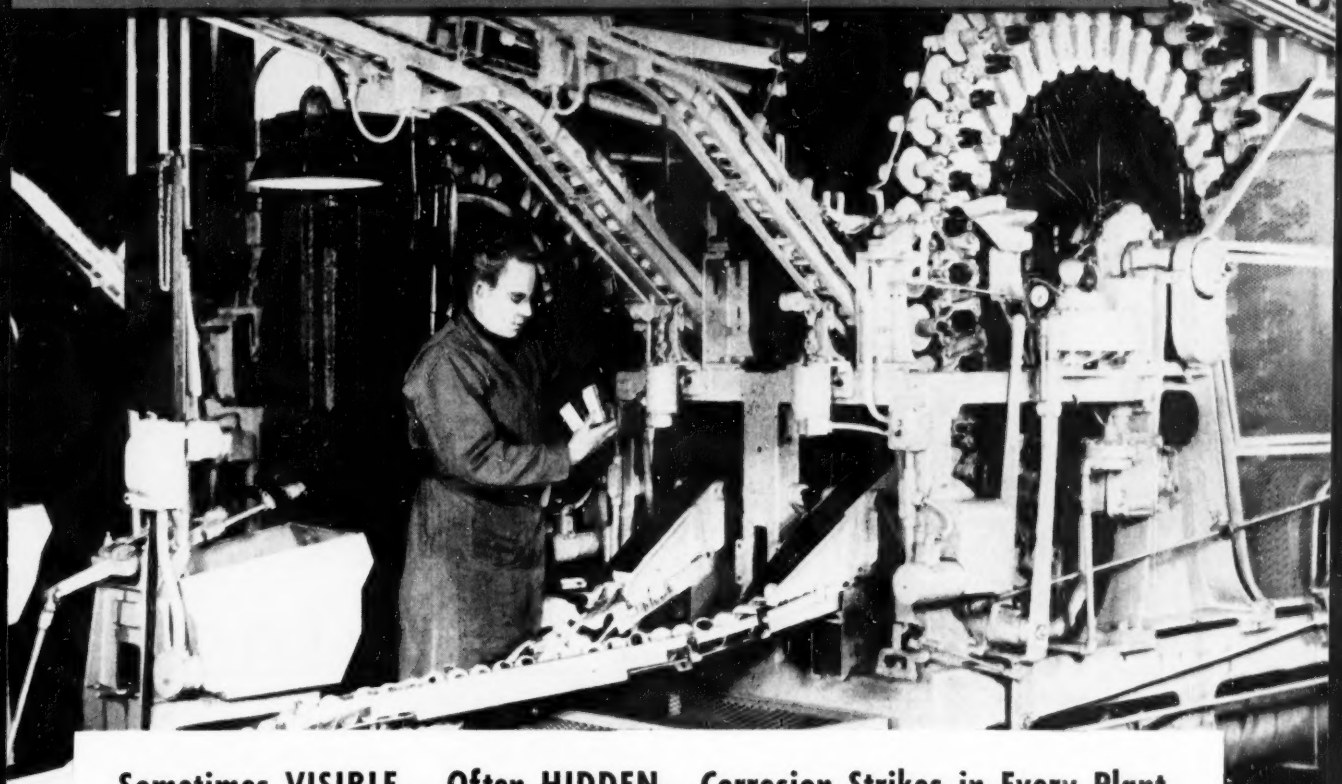
CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTI-PANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

CHEVROLET

IN THE FOOD INDUSTRY

There's more to CORROSION than meets the eye



Sometimes VISIBLE...Often HIDDEN...Corrosion Strikes in Every Plant

This year, the Food Industry will pay millions of dollars for needless losses created by corrosion ... *yet much of this corrosion may never be discovered* until it's too late to protect—and time to pay!

Even though rust is seldom visible in well kept, modern plants, corrosion is sure to be present. And, by far, the major costs of corrosion come from hidden areas—where only minute inspections and constant care can prevent costly failures.

YOU LOSE IN A "WAITING GAME"

Don't wait for rust or other visible signs to appear. Visible or hidden, corrosion will destroy costly equipment ... halt production ... cause unnecessary maintenance shutdowns ... and make plant clean-up more difficult. Thus corrosion dips deep into your profits as it creates needless losses totaling thousands of dollars.

YOU CAN PREVENT NEEDLESS WASTE

Check your plant for corrosion's presence. Double-check areas that may be vulnerable to *hidden corrosion*. If you would like help, an AMERCOAT Field Engineer will gladly assist you in making a thorough analysis. There is no obligation.

What is AMERCOAT?

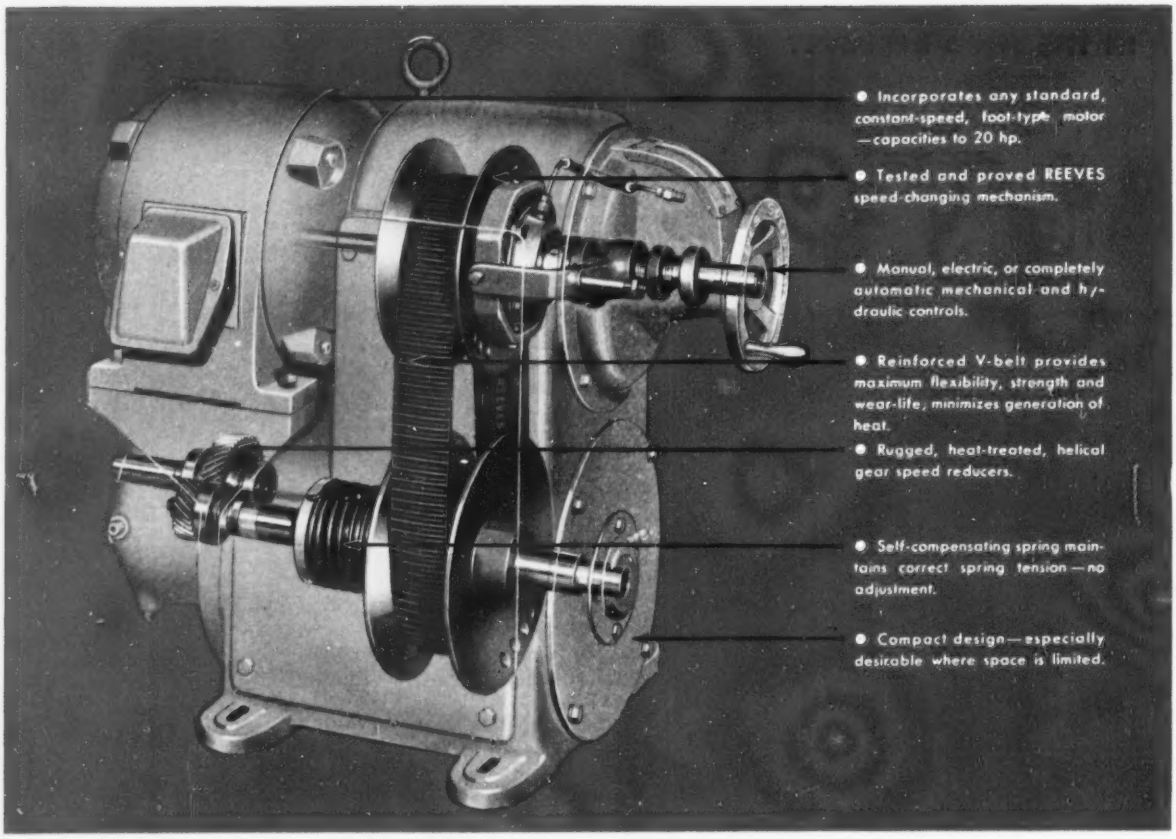
AMERCOAT is a method of corrosion control. Not just a single product, but a complete LINE of coatings, individually formulated to solve or control specific industrial corrosion problems.

FOLLOW THE LINE OF most RESISTANCE ... PROTECT WITH Amercoat!

AMERCOAT CORPORATION

4809 FIRESTONE BLVD., SOUTH GATE, CALIFORNIA

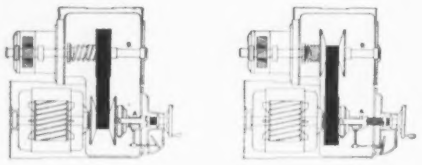
CHICAGO, ILL. NEWARK, N. J. JACKSONVILLE, FLA. DALLAS, TEX.


• Incorporates any standard, constant-speed, foot-type motor —capacities to 20 hp.
• Tested and proved REEVES speed-changing mechanism.
• Manual, electric, or completely automatic mechanical and hydraulic controls.
• Reinforced V-belt provides maximum flexibility, strength and wear-life; minimizes generation of heat.
• Rugged, heat-treated, helical gear speed reducers.
• Self-compensating spring maintains correct spring tension—no adjustment.
• Compact design—especially desirable where space is limited.

Everything's built in—

and built to give your machines trouble-free, stepless speed adjustability in the

REEVES Vari-Speed Motodrive®



Minimum Speed Position — Maximum Speed Position

REEVES Vari-Speed Motodrive utilizes proved REEVES operating principle of a V-belt driving between two pairs of cone-shaped discs which are adjustable to form an infinite number of driving and driven diameters. Discs are mounted on parallel shafts. One shaft receives power at constant speed from motor —other delivers power at infinitely adjustable speed to gear reducer from which desired speed is transmitted to driven machine.

Here's a complete variable speed power plant in one, space-saving unit . . . incorporating an operating principle proved in 300,000 installations . . . ruggedly constructed for years of trouble-free service. Without stopping the machine, a turn of the REEVES handwheel or touch of a button provides the correct speed for every operation . . . enables the machine to do *more* work and *better* work at lower cost. Available in vertical and horizontal designs; capacities to 25 hp; and speed ratios as great as 10 to 1. For the machines you are now operating and the new ones you plan to buy, obtain all the benefits of stepless speed adjustability by specifying modern REEVES Vari-Speed Motodrive. Send for free catalog No. FE67b-G.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized leader in the specialized field of variable speed control

accurate • variable **REEVES** *Speed Control*

For more information, use coupon on page 157.

Tested patterns to meet today's needs . . .

Jenkins cast steel Valves

for dependable economy

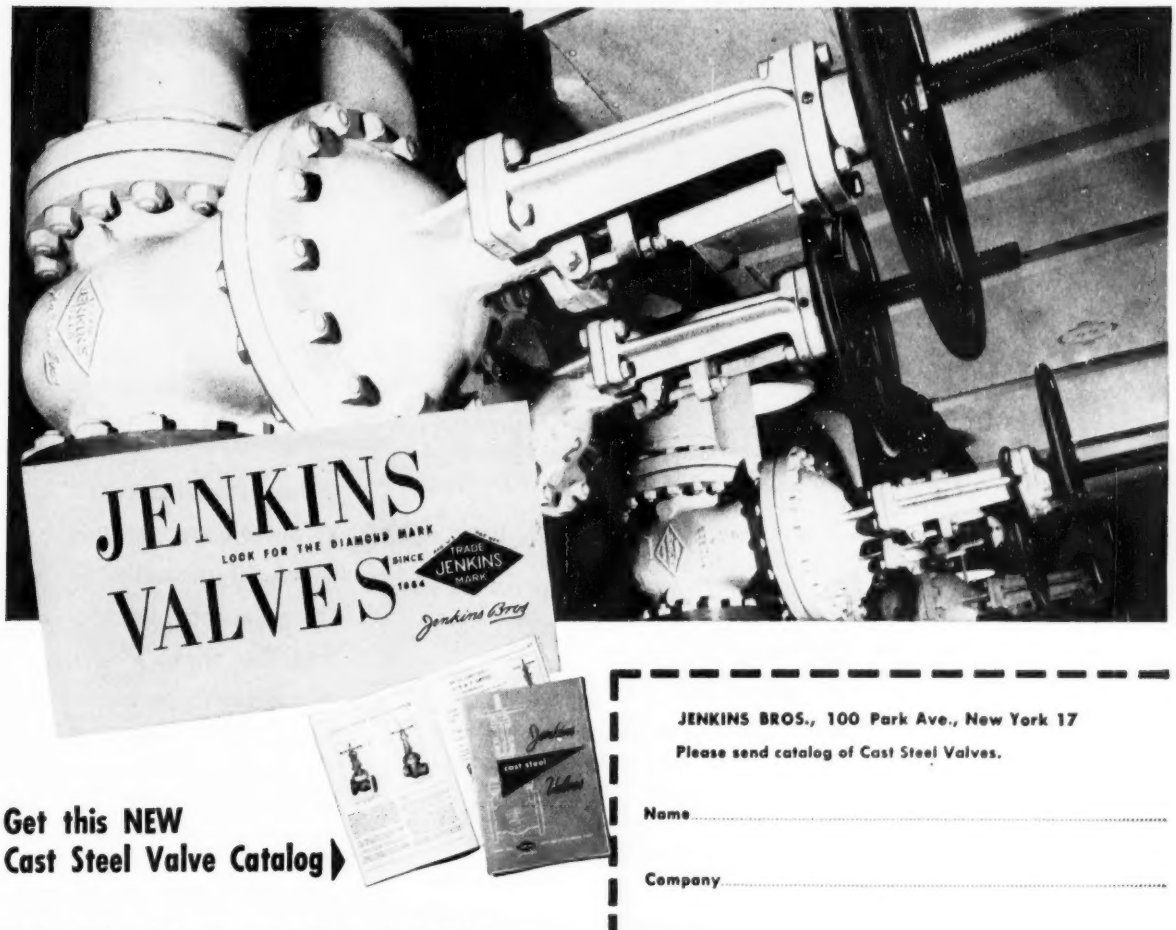
in high pressure

—higher temperature services

Mounting pressures and temperatures in power generation and industrial processing call for Cast Steel Valves. For this increasing need, Jenkins offers a wide selection of patterns that have met the test of the toughest services throughout industry.

In these valves, Jenkins provides a wide margin of strength and safety beyond ratings. Special refinements in design extend their service life, assure long, trouble-free performance. Efficiency and low maintenance records measure up to the high standards established for all valves developed by Jenkins Valve *specialists*.

The new Cast Steel Valve catalog gives complete information. Write for your copy today. Jenkins Bros., 100 Park Ave., New York 17.



Get this NEW Cast Steel Valve Catalog

Describes Globes, Angles, Gates, and Checks with detailed pressure ratings, dimensions, and other technical data covering all patterns of Cast Steel Valves now available from Jenkins. Send the coupon for your copy.

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Please send catalog of Cast Steel Valves.

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Company .....

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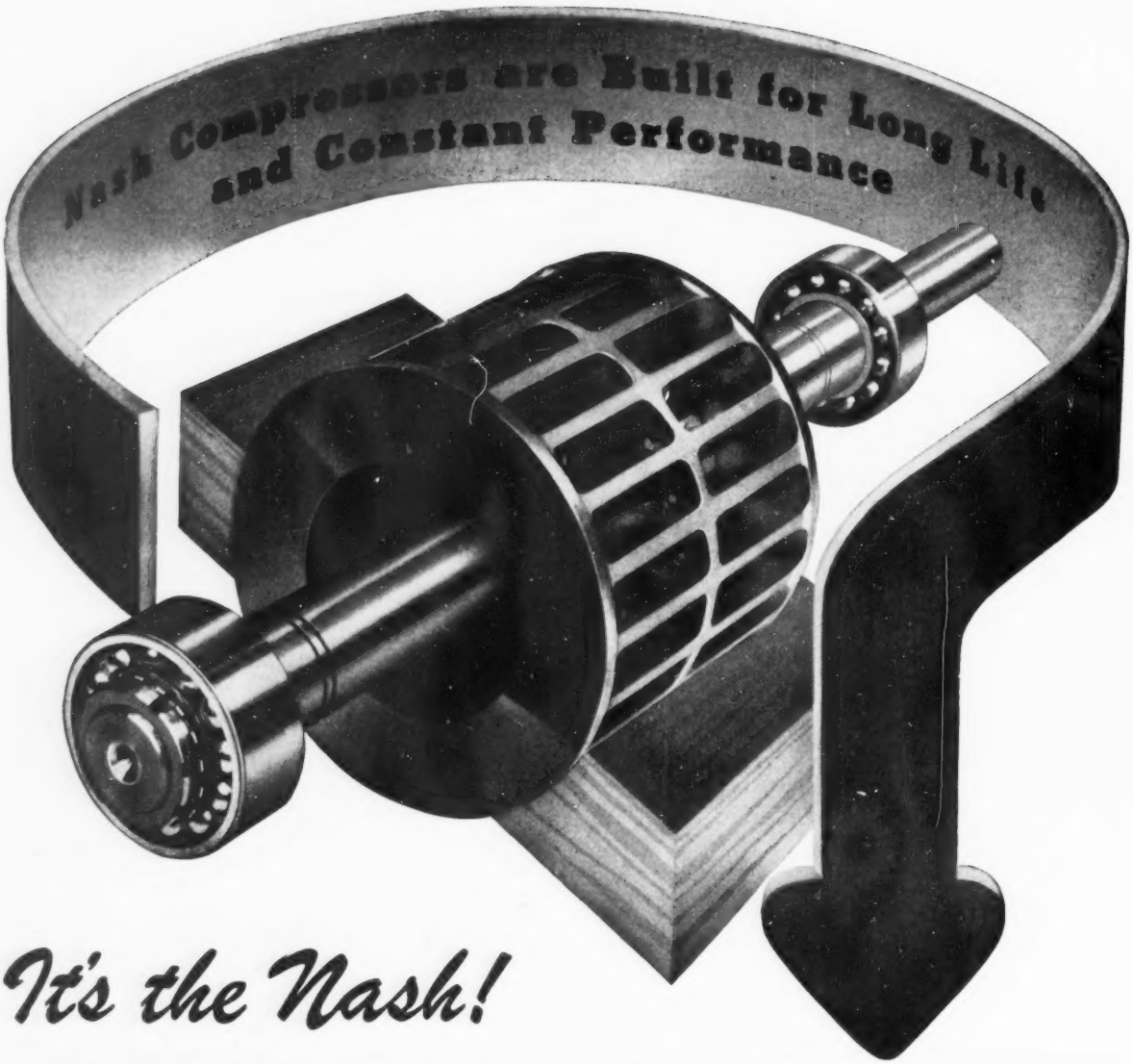


It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature Automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY

312 WILSON, SO. NORWALK, CONN.

FLAVOR is in the bag with NATURAL SPICES

True flavor that stays true and lasts "from making to eating" is assured only when you use natural spices.

For natural spices are the only flavorings that retain their full strength until eaten through nature's own unique protection. An intricate fibrous cell structure protects that flavor in natural spices against excessive evaporation, loss or change by volatilization, oxidation or chemical change.

If you want the full flavor to remain with your product, to bring the customers back for more, natural spices are a natural choice.

KNICKERBOCKER offers the finest in natural spices with a knowledge and skill gained in over 110 years of experience. KNICKERBOCKER natural spices are selected, laboratory tested and graded with maximum care and accuracy to give you the best at the best possible price. Don't look for spice bargains — there are none. The finest spices will bring the greatest returns in repeat business.

Naturally Better Spices = Better Baked and Canned Goods = Better Sales

KNICKERBOCKER

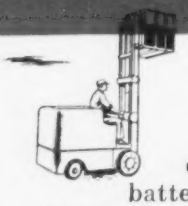
KNICKERBOCKER MILLS CO.

Since 1842 America's Leading Importers of Fine Spices

601 West 26th Street New York 1, N. Y.

Spices

INSIDE AN EXIDE-IRONCLAD



Inside . . . where it counts most . . . EXIDE-IRONCLAD is entirely different than any other battery. It's made that way by EXIDE'S exclusive IRONCLAD slotted-tube construction . . . a principle that provides direct operating-hour savings for you.

OF *ALL* BATTERIES, ONLY EXIDE-IRONCLADS HAVE POWER TUBE POSITIVES

The positive plate is different . . . unique . . . exclusive. It is the most effective retainer of active material yet demonstrated in heavy duty service. Slotted tubes contain the active material. So fine are the slots that, while permitting easy access of electrolyte, they retard the active material from washing out, hold it during repeated cycles of charge-discharge, and the vibration of rough use.

Today's battery-powered equipment is being used harder than ever before. Unless the batteries have internal shock protection they tend to deteriorate under hard usage—both electrical and mechanical. Only Exide-Ironclad has the plus-protection of the tubular positive that can withstand today's more exacting and rigorous heavy-duty battery services.

Your EXIDE sales engineer will give you the factual inside story. See for yourself why *only* an EXIDE-IRONCLAD gives maximum day-after-day service under the most difficult operating conditions . . . *with a minimum of maintenance expense.*

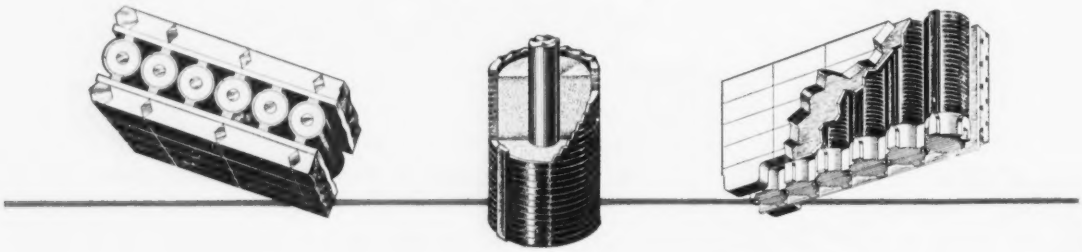
THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

1888 . . . DEPENDABLE BATTERIES FOR 65 YEARS . . . 1953

Cross section shows relation of positive plate to separators and negative plate. Note the much greater exposure of active material to electrolyte as compared with that of the usual flat positive plate. This greater exposure makes possible the high power ability and uniform-voltage characteristics of the Exide-Ironclad. The negative plates have been made extra heavy to balance the increased capacity of the power tube positives.

Running through center of each tube is an alloy core which is cast with the heavy top cross bar. These form the sturdy, non-buckling grid. Both core and top bar are made of Exide's new corrosion-resistant Silvium, an alloy of silver, lead and other components, which adds greatly to plate's long life.

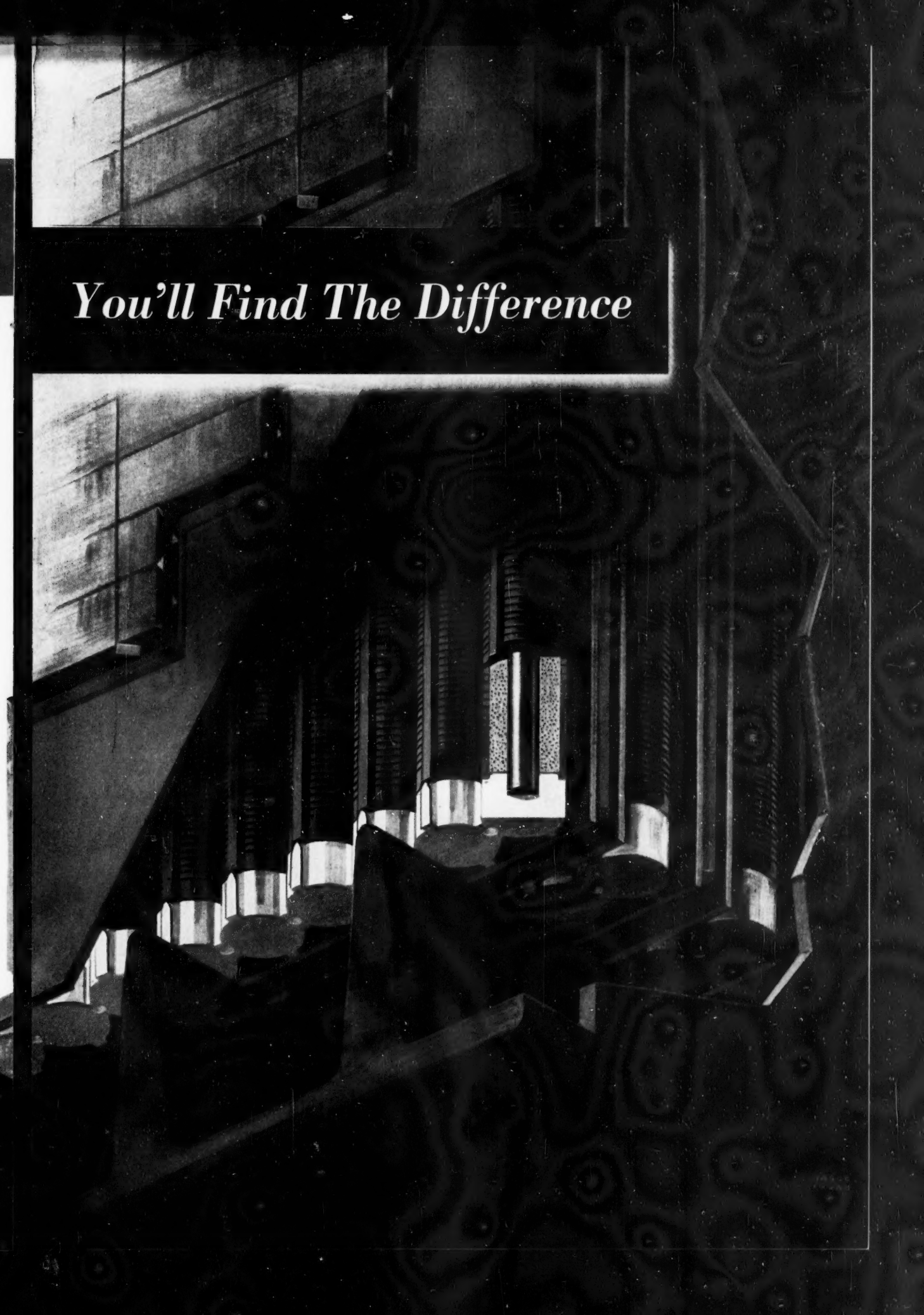
New polyethylene insulating tube sealer of acid-proof, non-corroding plastic fits snugly into bottom of slotted tubes and further reduces loss of active material. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.

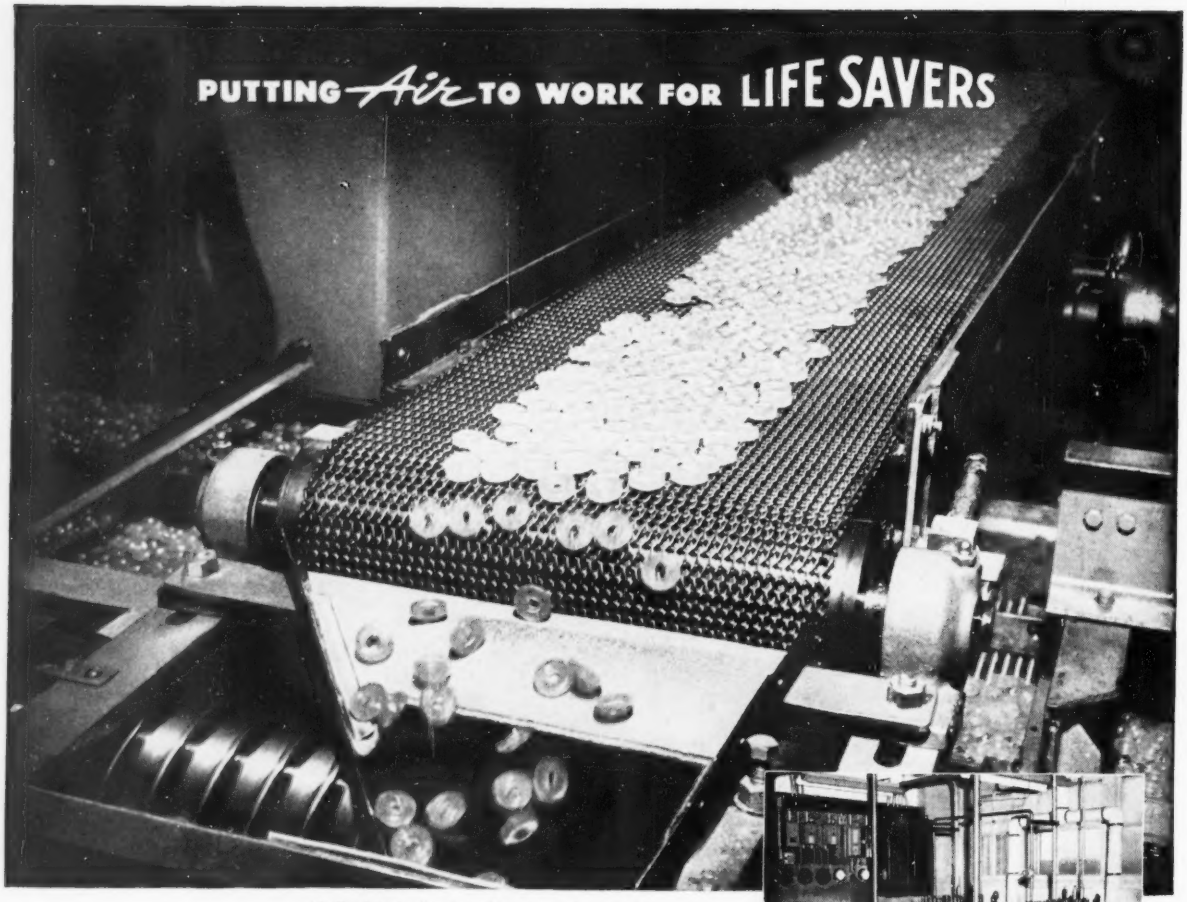


Exide-Ironclad

YOUR BEST POWER BUY . . . AT ANY PRICE

"Exide-Ironclad" and "Silvium" *Reg. T.M. U.S. Pat. Off.*


You'll Find The Difference



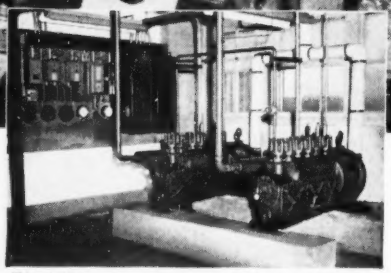
Air Conditioning by: J. P. Salmini Co., Inc., Bridgeport, Conn.

COOL AIR
STEPS UP A FLAVOR PARADE

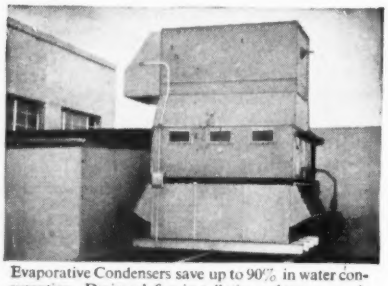
At Life Savers, intricate machines stamp out the familiar "candy with the hole"—3,600 a minute! When formed, the candy drops are soft and pliable. During the critical next few minutes, they must be cooled quickly and evenly.

Westinghouse equipment *puts air to work* for Life Savers by providing chilled air through which the candy drops travel on conveyor belts. In addition, the candy production department is air conditioned. Clean, cool air conditioning by Westinghouse assures the uniform quality for which Life Savers are famous the world over.

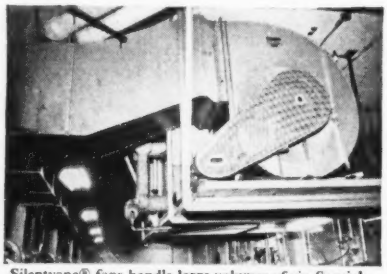
There's Westinghouse Air Conditioning equipment specifically designed to make air work *for you* in food processing... whether it's air conditioning, air handling or air cleaning. Call the Westinghouse Air Conditioning Distributor in your classified phone directory, or write Westinghouse Electric Corp., Air Conditioning Division, Hyde Park, Boston 36, Mass.



Westinghouse Compressors are the heart of this cooling system. Hermetically sealed for maximum dependability.



Evaporative Condensers save up to 90% in water consumption. Designed for installation where water is scarce.



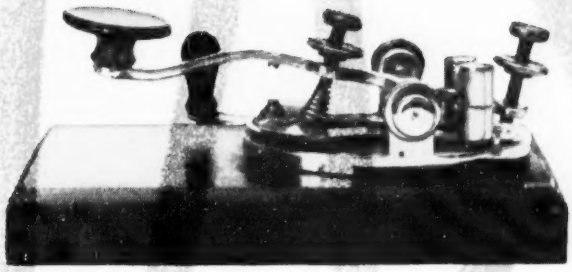
Silentvane® fans handle large volumes of air. Specially designed blade wheel delivers non-pulsating air flow.

YOU CAN BE SURE... IF IT'S

Westinghouse

J-80219

FLASH!



NOW! THE FIRST AND ONLY INSTANTLY SOLUBLE CHICORY!

CHIC-QUIK

100% PURE, HIGHLY CONCENTRATED, NATURAL PRODUCT!

At last! An instantly soluble chicory in powder form...*ready to use!* It's 100% pure, a natural product of the highest concentration. No matter what food product you make, you're sure to make it better with CHIC-QUIK. Try it...taste the difference CHIC-QUIK makes. It intensifies flavor. It builds body. It enriches color. *Add it to coffee*...CHIC-QUIK not only brings out the fullest flavor and aroma, it also develops a richer color that makes coffee look as good as it tastes! *Add it to soups, bouillons, sauces, gravies and prepared meats*...it yields a new, meaty, full-bodied flavor. *Add it to cereals, chocolate cakes, candies*...you'll recognize the difference at first taste! Rush coupon for full details and trial order of CHIC-QUIK!

AMERICAN FOOD LABORATORIES, Inc.

860 Atlantic Avenue, Brooklyn 17, N. Y.

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Philadelphia • Baltimore • Detroit • Chicago • San Francisco

A Major Advance in Food-Making
of Vital Interest To Manufacturers of

COFFEE & INSTANT COFFEE
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SAUCES & GRAVIES
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Please rush trial order of CHIC-QUIK and full details.

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BUSINESS ADDRESS

CITY ZONE STATE

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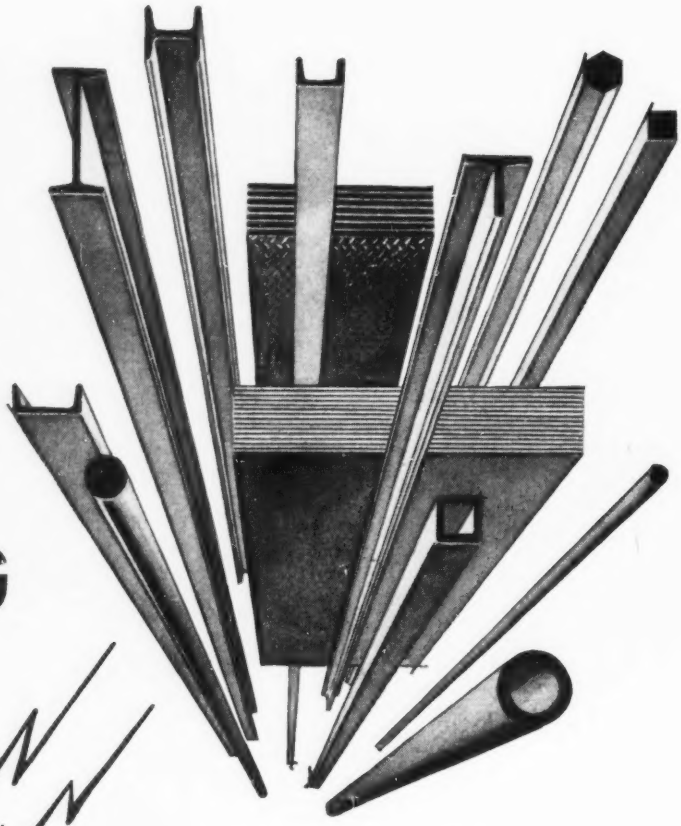
STEEL for FOOD PROCESSING



In stock...Prompt shipment

We carry a wide range of steel products in our 15 plants strategically located from coast to coast.

A good many kinds and sizes are in short supply at the present time, but we are still able to take care of most requirements.

So when you have any problem of steel procurement, application, or fabrication, we will be glad to work with you.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled & cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot & cold rolled, many types & coatings
TUBING—Seamless & welded, mechanical & boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated
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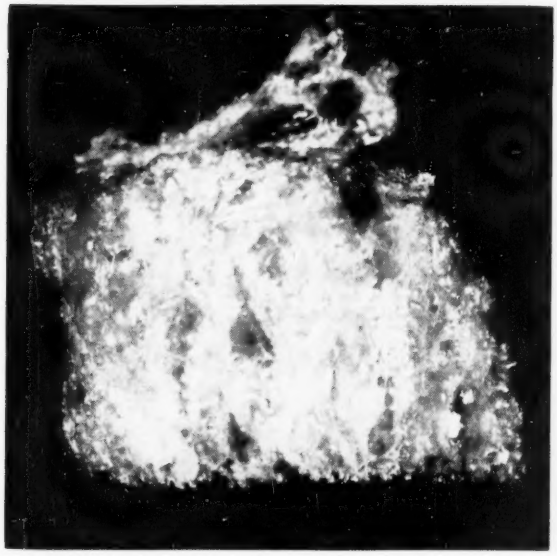

SPONGE-LIKE open structure of dehydrated juice is an aid to drying and simplifies granulation. Product is puffed to 20 times original volume.

DEHYDRATOR operates at 29-in. vacuum and temperatures up to 300 deg. F., with automatic control during drying cycle. Concentrate in trays puffs as it dries.

WRRL Develops Techniques for Making

Puffed Powder From Juice

Instantly soluble in ice water, powder may compete with liquid juices. Process involves innovations in vacuum dehydration, flavor stabilization, and packaging

S. I. STRASHUN and WILLIAM F. TALBURT

Western Regional Research Laboratory (Bureau of Agricultural & Industrial Chemistry, Agricultural Research Administration, USDA), Albany, Calif.

Rapid strides have been made recently at Western Regional Research Laboratory, Albany, Calif., in the production of stable powders from fruit and vegetable juices.

The procedures necessary for preparing these powders depend largely on recent innovations and modifications in vacuum dehydration, flavor stabilization, and packaging. These new products may compete in quality, and perhaps eventually in price, with their conventional liquid counterparts.

Powders which reconstitute almost instantaneously even in ice water have been made from orange juice, lemon juice, apple juice, tomato juice, grape juice, pineapple juice and grapefruit juice. These have been prepared with and without the use of additives.

While storage tests have not been conducted on all these products, data accumulated indicate that they are quite stable at room temperature. Orange powder (containing 40 percent added corn syrup solids) is acceptable after six months at 100 deg. F.

This work was undertaken at the request of the Quartermaster Corps with the primary objective of developing highly concentrated foods that can be used by the armed forces. Dehydrated orange juice has recently been successfully produced for armed services' evaluation by Vacu-Dry Co. of Oakland, Calif., using WRRL procedures (see news item, FE Jan. p. 186).

Additional uses may be developed for these powders, for homes and institutions, in both domestic and foreign markets, or in remanufactured foods.

A rather viscous, concentrated juice containing at least 50 percent soluble solids is employed to obtain dry material with the properties desired. Using a concentrate also increases the output of the vacuum dryer by reducing the amount of water to be evaporated.

When single-strength juice contains volatile flavoring constituents—as is the case with apples, pineapples, or grapes—these constituents can be recovered during concentration for re-use in later stages.

The concentrated juice, which may contain drying aids or other additives as desired, is allowed to flow onto metal trays. These are placed in a vacuum chamber which is equipped with tubes or hollow shelves for supporting them. Steam or water is circulated in these shelves or tubes so that the juice concentrate can be rapidly heated or cooled.

High shelf temperatures are used during the first part of the drying cycle, when evaporation is sufficiently rapid to prevent excessive rise in product temperatures. As drying progresses, the shelf temperature is re-

duced to maintain a safe product temperature and avoid undesirable flavor changes.

This drying method produces an open, sponge-like structure—an aid to rapid drying and, also, rapid reconstitution. This structure can be obtained only by drying from a liquid film and cannot be produced by lyophilization or freeze-drying, a more costly drying procedure. The extremely low pressures necessary for freeze-drying are not required for this type of liquid-film or "puff" drying. In producing such heat-sensitive products as orange powder, using a liquid film of approximately $\frac{1}{8}$ in. thickness, the drying cycle is 1 hr.

Since the powders are quite friable, they are easily removed from trays. Detraying, crushing, screening, and packaging are carried out in a room maintained at low relative humidity, so that these hygroscopic powders do not become sticky.

At WRRL, production of fruit and vegetable powders has been confined entirely to batch-type operations. Several types of commercial belt-type vacuum dryers—as used for drying soluble coffee and pharmaceuticals—should be suitable for powder preparation.

Volatile flavors removed during processing are reincorporated in the powders so that the reconstituted juices will have natural aromas and characteristic flavors. Since most flavors are known to be susceptible to oxidative and perhaps other undesirable changes, storage stability can be increased by "locking in" flavor using sorbitol[1], or other suitable materials, as the protective barrier. The sorbitol (a relatively inexpensive edible material) is melted and the concentrated flavoring material is slowly added with rapid stirring to form a stable emulsion of the two components.

This emulsion is allowed to solidify and is then ground into particles of suitable size and incorporated into the powder. Since sorbitol is readily soluble in water, these granules rapidly release their flavor when the powder is reconstituted.

In-Package Desiccation

Another important innovation contributing in the development of these powders is in-package desiccation. This packaging procedure was developed at WRRL during World War II as a means of extending the storage life of various dehydrated products[2]. A patent covering the application of this principle to orange juice was issued in 1950 to a private company[3].

In-package desiccation is accomplished by sealing the product in a hermetic container along with a sufficient quantity of desiccant (CaO). This absorbs residual water from the powder. The desiccant is enclosed in a sift-proof moisture-permeable package which will permit transfer of water vapor from the product to the desiccant but will not allow the desiccant to contaminate the product.

It has generally been assumed that moisture contents of not more than 1 percent are required to impart stability to these powders. By the use of in-package desiccation, powder can be removed from the dryer with moisture content of 3 percent or even higher—thus reducing the drying cycle several hours under that required for drying to 1 percent moisture.

Tests show that the desiccant has reduced moisture content of orange powder samples from 3 percent to below 0.5 percent during a six-month storage period. The advantages of in-package desiccation outweigh the disadvantages of its additional cost and the sacrifice of 10 to 15 percent of container space occupied by the desiccant.

In order to obtain a 50 deg. Brix tomato concentrate, which will expand in drying, part of the pulp or water-insoluble solids must be removed.[4] The serum is then concentrated. This serum concentrate and pulp are dried separately and the two resulting powders are recombined. There is no need for reincorporating volatile flavoring components in this powder.

Using "puff" drying procedures, a powder with excellent color and which reconstituted readily was prepared from pineapple juice concentrate with much of the pulp removed. If additional pulp is desired, it may be obtained by the method used for incorporating pulp in tomato powder. Since pineapple flavor is quite volatile, it is necessary to reincorporate it.

Concentrates of clarified apple juice puff-dry readily. Volatile flavors are almost entirely removed during dehydration. Reincorporation of essence is therefore necessary.

Concentrates of clarified grape juice also puff-dry readily and retain significant amounts of volatile flavoring constituents even in the low-moisture powder. However, without fortification, the reconstituted juices are somewhat lacking in characteristic flavor.

References

1. U. S. Patent No. 2,566,410, Sept. 4, 1951, "Solid Essential Oil Concentrate and Process for Preparing Same"; William C. Griffin, (Editor's note: Assigned to Atlas Powder Co.)

2. L. B. Howard, "Desiccants Improve Dry Packs," *Food Packer*, p. 31, Apr. 1945.

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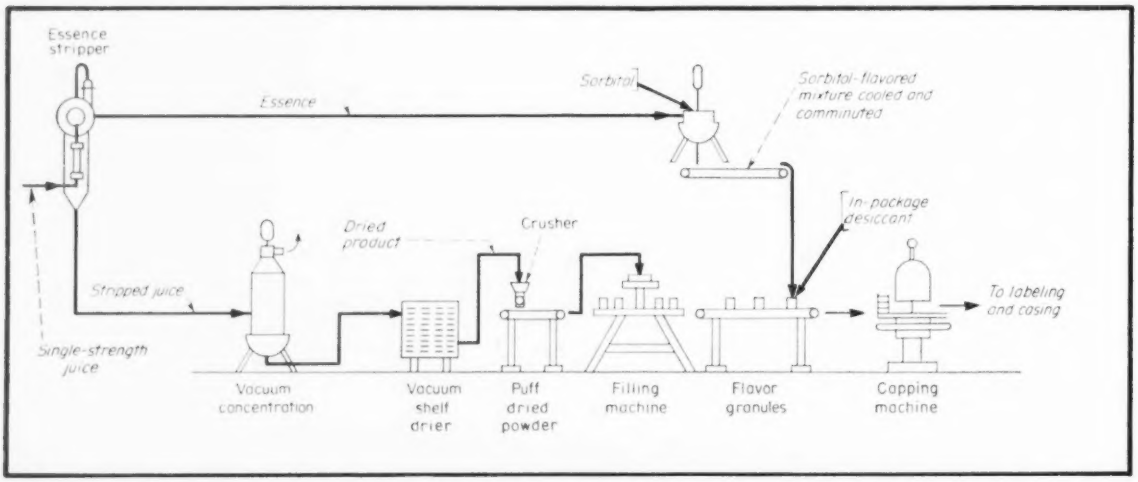
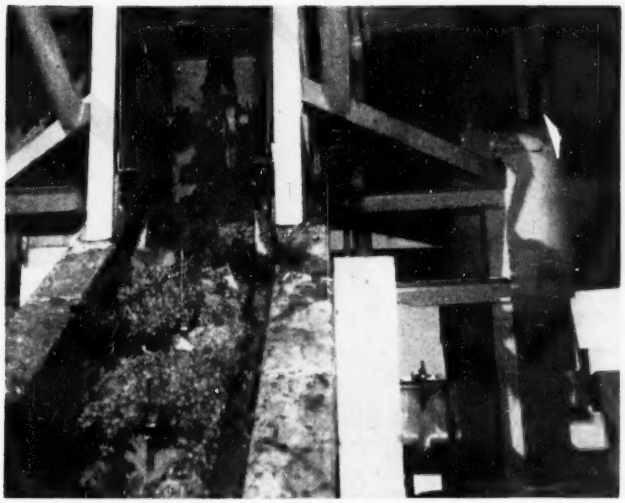
4. G. J. Keller, R. G. Rice, and R. J. McColloch, "A Low Temperature Concentrated Tomato Juice," *Western Canner & Packer*, p. 26, Aug. 1952.



FLOW DIAGRAM of process for producing full-flavored, sponge-like, low-moisture, stable juice powders. A continuous belt-type vacuum dryer should be suitable as a substitute for the batch-type vacuum shelf dryer.



GRAPES DROP from the elevator into a pre-breaker and are fed to the disintegrator, seen at right.

HEAVY MUST (juice, skins, stems) is pumped from disintegrators to fermenting tanks.

Use of Disintegrator to Replace Crusher

Raises Yield, Halves Labor

California winery effects virtually complete recovery of juice and distilling material from grapes and at same time cuts operating costs

FE STAFF

Wines may be our "romantic" beverages. But, winemakers face up to the same cold production figures like any other processor. It's a matter of, "How much do you recover from your raw material and what are your production costs?"

In winemaking, as in other processses, one of the major methods of cost reduction comes through mechanization. A. Perelli-Minetti & Sons, Delano, Calif., pioneered (1951-52) the first use of disintegrators for wine-grape crushing.

Their adaption of this machine, which replaces the conventional crusher, has resulted in a number of savings and efficiencies.

Most outstanding of these is the virtually complete recovery from grapes of juice and distilling material. Available data being incomplete, no exact comparison figures are now available. However, it is known that the yield of free-run juice is appreciably higher, and there is a definite increase in proof-gallons per ton of grapes. And in addition, man-hours required for crushing operations have been reduced one-half.

Clean-Up Time Saved

Using the disintegrators, clean-up time has been cut 75 percent, compared to the crushers. Formerly, about 3 hr. were required to wash down a crusher. But it takes only 30 min. for a disintegrator, the unit being sanitized with steam in about 3 min., simply by turning a valve.

With the old method, grapes were crushed and, at the same time, stems were separated from the must. It was pumped to fermenting tanks and allowed to settle. Free-run juice was then pumped to tanks for further fermentation, or directly to the fortifying tanks if sufficiently fermented. The remaining pomace was washed and drained several times and then pressed. This wash water, press juice, and the wash water from stem washing were then combined to form distilling material. Pressed pomace and washed stems were hauled away by trucks.

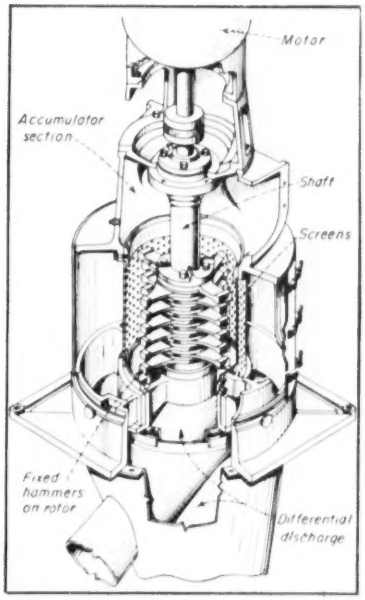


DIAGRAM of Rietz disintegrator showing working parts.

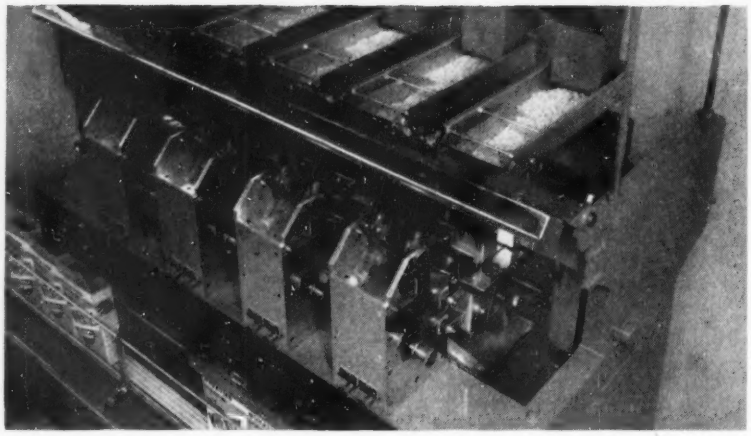
In the fermenting room, the major cost was the handling of pomace and stems. There was also considerable loss of sugar and alcohol from uncrushed berries and raisins left in the

(Turn to page 72)

Air-Gap Weighing Cuts

Fast, precision carton filling achieved with new net-weight packaging principle. Year's trial run in General Mills plant proves advantages. Tests chart accuracy.

FE STAFF



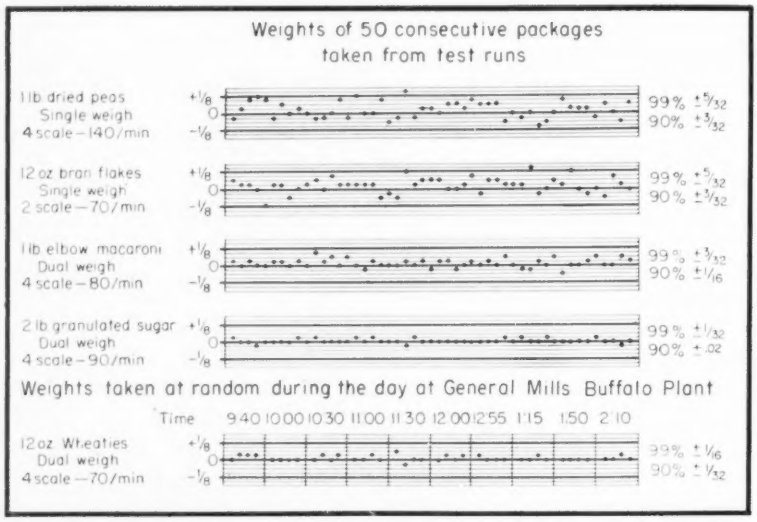
FAST PRECISION is achieved with this four-head, pneumatic-weigh carton filler. It has scaled up to 80 packages (12 oz.) of Wheaties a minute, with 1/8 oz. saving in overfill. Vibrating conveyors feed unit.

CLOSER tolerances in net-weight filling are eagerly sought by food manufacturers. And all want this precision in combination with high-speed packaging-line operation.

Now comes a significant achievement in this direction. It has been made by applying a principle employed in pneumatic control instruments and in air gages which check precise dimensions of metal parts.

It is the principle of sensing, or detecting, minute change or variation in a gap through which a minute stream of air is directed under pressure. As the gap narrows, less air escapes through it, and back-pressure builds up in the air jet. This pressure build-up can be measured or used to operate an air relay to actuate mechanical devices.

This precision technique has been applied for weighing on a straight-line, multi-head, net-weight filling machine. Developed by Pneumatic Scale Corp., this packaging innovation has proved its mettle in a year's shake-down run in the Buffalo plant of General Mills.



PRECISE PERFORMANCE of Pneumatron is dramatically demonstrated by five charts showing over- and underfill. Check weights are plotted for 250 packages which were filled on the machine.

Action Described

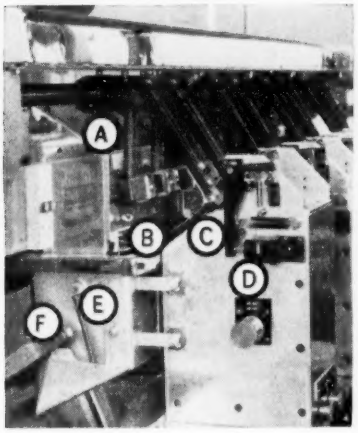
Here briefly is how it works (details are given in the accompanying weighing-head schematic diagram and caption): The weighing receptacle is attached to a cantilever-beam assembly. The beams, or leaf springs, are fixed at one end and are free to move at the other. As they are deflected by product weight in the weighing receptacle, the gap above a fine air jet is narrowed infinitesimally. This builds up back pressure in an air relay to operate a shutter that stops flow of product into the weighing receptacle, then cam action dumps the weighed material into a carton.

Continuously balanced, the cantilever-beam assembly moves only a few thousandths of an inch during scaling. And the pneumatic sensing unit can pick up beam deflection in millionths of an inch and weighs within hundredths of an ounce. This gives unusual weighing accuracy, coupled with fast dependable action. Dramatic evidence of performance accuracy is presented in the five over- and underfill charts on this page. Translated into product savings, it is easy to see why a user of the machine is considering the purchase of more units.

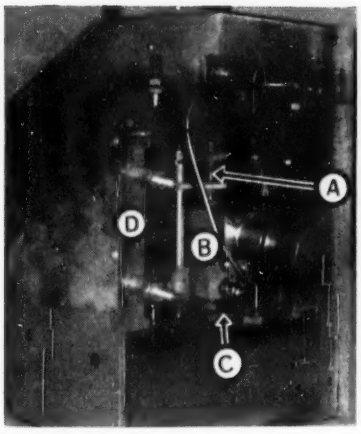
Called the Pneumatron, this precision machine is equipped with either single- or dual-weighing facilities, and either two or four filling heads. The four-head machine is said to handle as many cartons per minute as a six-scale conventional net-weight filler.

In single-stream weighing, hoppers are emptied after a uniform stream of product is scaled. For dual-stream weighing, hoppers are equipped with two sets of shutters. One closes after the bulk of the material is fed into the weigh receptacle, and the other after more product is dribble-fed to reach the correct weight.

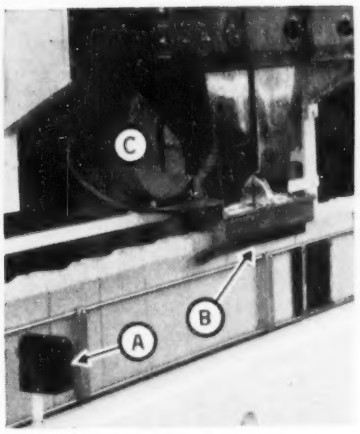
Top speed for dual weighing is placed at about 90 a minute on the



KEY PARTS: (A) hopper. (B) shutter. (C) shutter latch. (D) latch air cylinder. (E) receptacle. (F) dumper.



AIR-GAP SCALE: (A) air jet. (B) air relay. (C) cantilever leaf spring. (D) bracket for weigh receptacle.



WASTE SAVERS. (A) no-carton, no-fill photoelectric control. (B) suction liner opener. (C) suction fan.

Overfill

four-scale machine, and 45 on the two-scale unit, for free flowing materials. About 140 a minute is maximum speed for the single-stream, four-head machine, 70 for the two-header.

At the Buffalo plant of General Mills, a dual-weighing, four-head filler handled up to 80 packages a minute of the breakfast cereals Wheaties and Cheerios. And this with a reported average saving of ¼ oz. in overfill. Although this was in the nature of a test, or shake-down operation, the machine proved its capabilities.

Another of the machines has been installed for packaging breakfast cereals at the Battle Creek, Mich., plant of Post Cereals Division of General Foods Corp.

Performance of the machine on the food plant packaging line indicates that it will eliminate any need for continuous checkweighing of all packages. Occasional packages, of course, must be checked—the machine has yet to be invented which cannot get out of precise operating order.

Accuracy of the cantilever-beam unit has not been impaired by plant vibrations, and the unit gets an OK in respect to amount of downtime and maintenance. But maintenance is a job for a skilled man, as with other precision machines and instruments. Also it is absolutely essential to accurate operation that the air used in the weighing system be completely free of all foreign matter, such as oil or dust. This calls for a high-quality filter in the air-supply line.

Weighing accuracies are shown in the accompaning chart. Here, variations for 99 percent of the packages ranged from a 1/32-oz. low for sugar (2-lb. units) to a 5/32-oz. high for bran flakes (12-oz. units). Also tested, and within this range, were dried peas, elbow macaroni, and Wheaties.

This increased accuracy reduces overweight give-aways, saving thousands of dollars annually.

On a control panel below each weighing head, there is a dial for vary-

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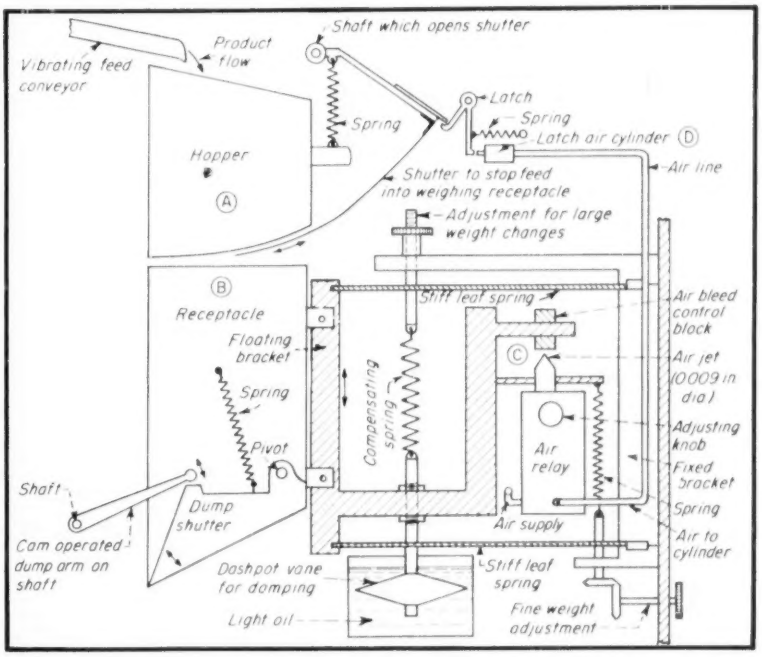
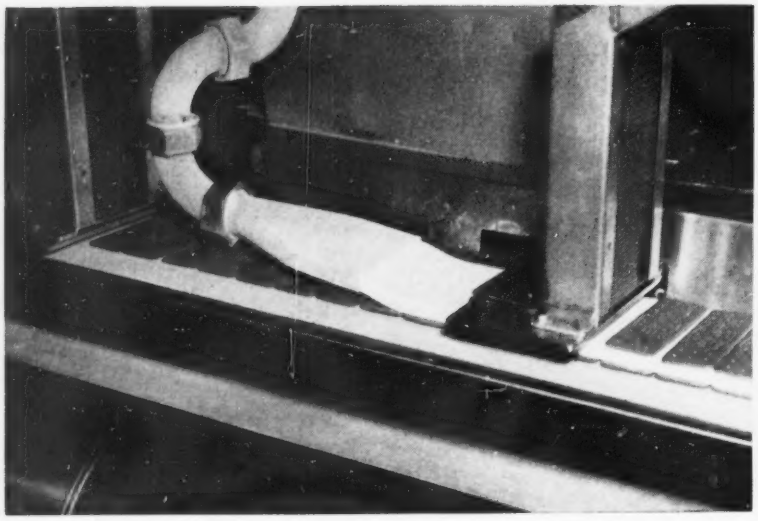
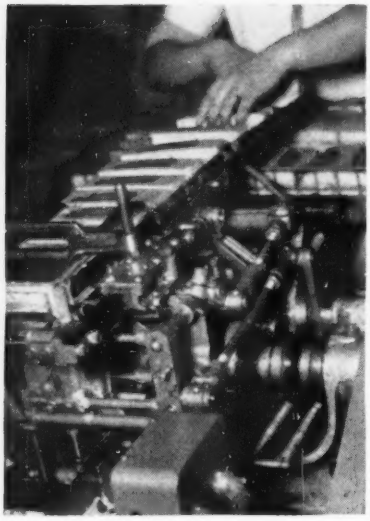


HOW IT WORKS is shown by this schematic diagram: Vibrating conveyor discharges product into hopper (A), from which it flows into receptacle (B) attached to weigh-beam unit (cross hatched). Correct net weight deflects cantilever leaf springs slightly, lowering block above air jet (C) to build up back pressure in air relay. Valve in relay then releases air pressure behind piston in latch air cylinder (D), allowing spring to trip latch. Another spring then closes shutter at bottom of hopper to cut off flow of product into weigh receptacle. Cam action then operates dump shutter on bottom of weigh receptacle, discharging correct weight of product into carton through chute. Then cam action opens shutter on hopper under vibrating conveyor, and shutter is held open by latch, which now is held in locking position by restored air pressure in cylinder. Then the cycle repeats. Mechanism for making large and fine weight adjustments are shown, as is dashpot damper which eliminates weighing-head oscillation.





SANDWICHES at 300 doz. per hr. Left photo: wafers are deposited on moving belt to receive layer of ice cream (center). Second wafer goes on (right). Sandwiches are wrapped (right photo), and wrappers heat-sealed.

Strategic Plant Expansion Wins

Advanced-Unit Advantages

Labor is saved, quality guarded when selected equipment is assembled in room designed specifically for making ice cream packages and novelties

ARTHUR V. GEMMILL
Associate Editor, "Food Engineering"

When Pioneer Ice Cream Div. of The Borden Co. went about enlarging its Paterson, N. J., operation, it found it had a strategic advantage.

And it used it.

Whereas other expanding companies have sometimes felt they had to continue the use of their previously employed equipment — even though the buying of new units would improve production labor-wise and quality-wise—Pioneer's new endeavor was not hobbled by such a question.

Here, expansion was for the prime purpose of adding package goods and novelties. And since this plant had been turning out only bulk ice cream, it was not hampered by old units needing to be accounted. It could go right ahead with new equipment.

Accordingly, it built a new room especially for the additional operation, and it installed therein the latest labor-saving and quality-protecting units.

As a result, the plant is now—

. . . Making and wrapping ice cream sandwiches automatically.

. . . Continuously hardening package ice cream in all sizes up to ½ gal. in 120 min. or less, and

. . . Producing chocolate-coated stick novelties at a rate of more than 100 doz. per man-hour on a new fully-automatic rotative unit.

The plant's service is broad, too—for it is supplying the entire needs of its Northern New Jersey customers, and also of branches in Asbury Park, N. J., and Middletown and Peekskill, N. Y.

Sandwiches Wrapped, Sealed

The sandwich operation is performed in two integrated steps—production and wrapping. In the first step, an Empire Sandwich-Matic processing unit dispenses a continuous row of wafers on a moving sanitary belt. As wafers are conveyed forward, they move under a flat nozzle that extrudes a ribbon of ice cream fed continuously from a Vogt freezer. Then the row passes under another dispenser that deposits wafers on top of the ice cream (see left photo above).

Next comes wrapping and sealing. Finished sandwiches from the Empire machine are conveyed to a Lynch Morpac automatic wrapper. This unit receives printed wax paper from a roll, cuts it to desired size, wraps all sides of the sandwich, then heat-seals the wrapper as it passes over a sealing unit operated at about 525 deg. F.

Wrapped products are hand-packed in special wire baskets, then go through a freezing tunnel for quick hardening before packaging for delivery.

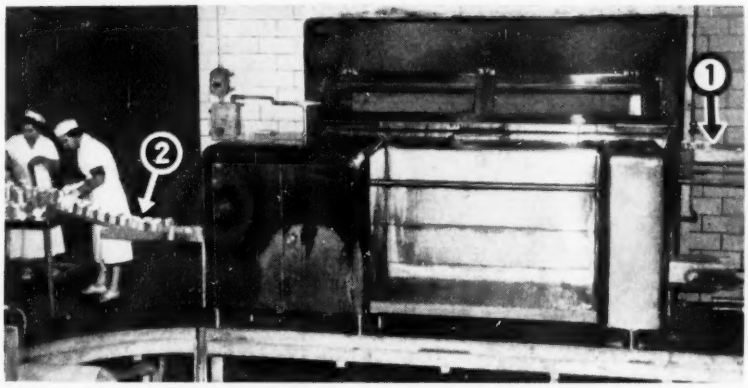
Sandwiches are produced at 300-400 doz. per hour by a crew of just one man and three women.

Hardening Unit

The new quick freezing equipment for packaged goods—capacity 425-450 gal. per hr.—has a number of advantages over previously installed tunnels. Most important of these are its simplicity and versatility. Formerly, tunnels were designed for one-size items—usually pint packages—and could not handle larger units.

However, this plant's Votator equipment, made by Girdler Corp., Votator Div., was constructed to handle packages up to 8½ in. wide x 6 in. high. And in the smaller range, units

Versatile Hardener



TOP: Containers of soft ice cream are conveyed into continuous freezer (1), hardened products discharged (2). Photo above: Inside unit, packages of hardened ice cream are pushed from tray onto discharge conveyor.

of less-than-pint size may be run by assembling them in larger containers before they enter the freezer.

In operation, packages are conveyed directly from filling and closing and automatically assembled in rows at the feed end of the freezer. (Icebox pints, ½-gal., and boxes of small items are run in a single line, round pints in a double row.)

To permit loading and unloading rows of packages, freezer operates in cycles. Feed from filling unit may be continuous, however. Once each cycle, a gate, located where the conveyor enters the unit, closes to stop movement of packages outside the freezer. Then a pusher mechanism contacts the entire row of packages that is assembled inside the unit and moves it sidewise onto a tray.

Pusher then recedes, gate opens, and more packages move into feed position. At the same time, frozen packages are removed from a tray, by a similar pusher mechanism, and deposited on a discharge conveyer directly below the loading conveyor.

Within the equipment there are

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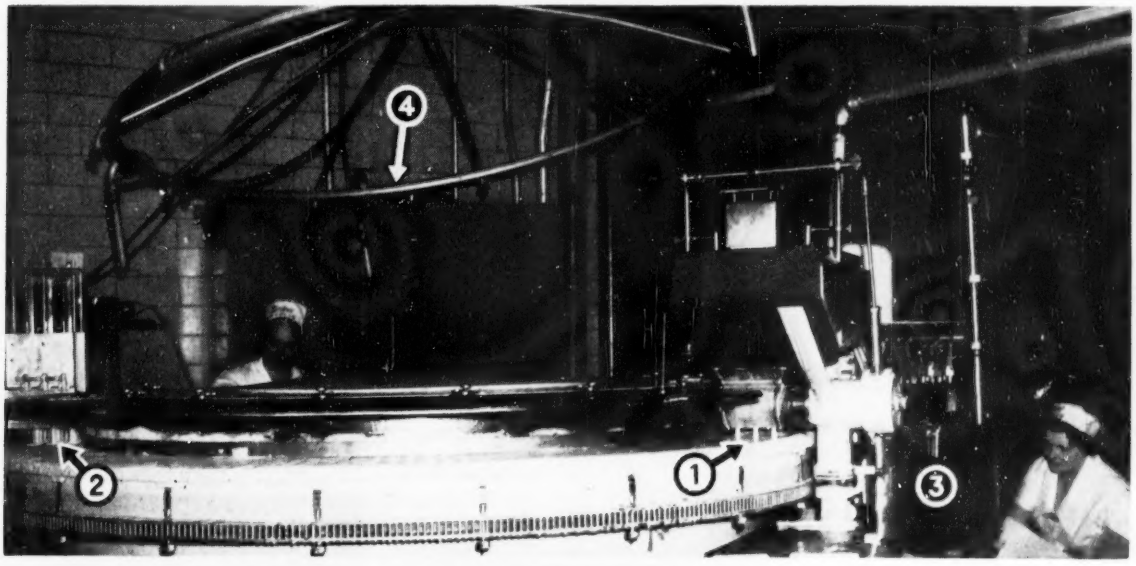
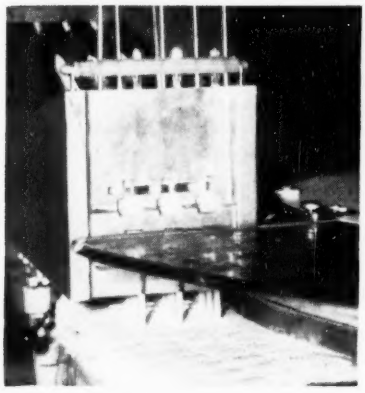
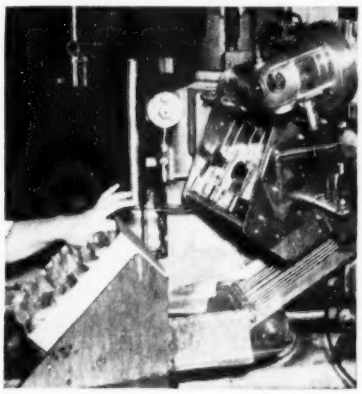
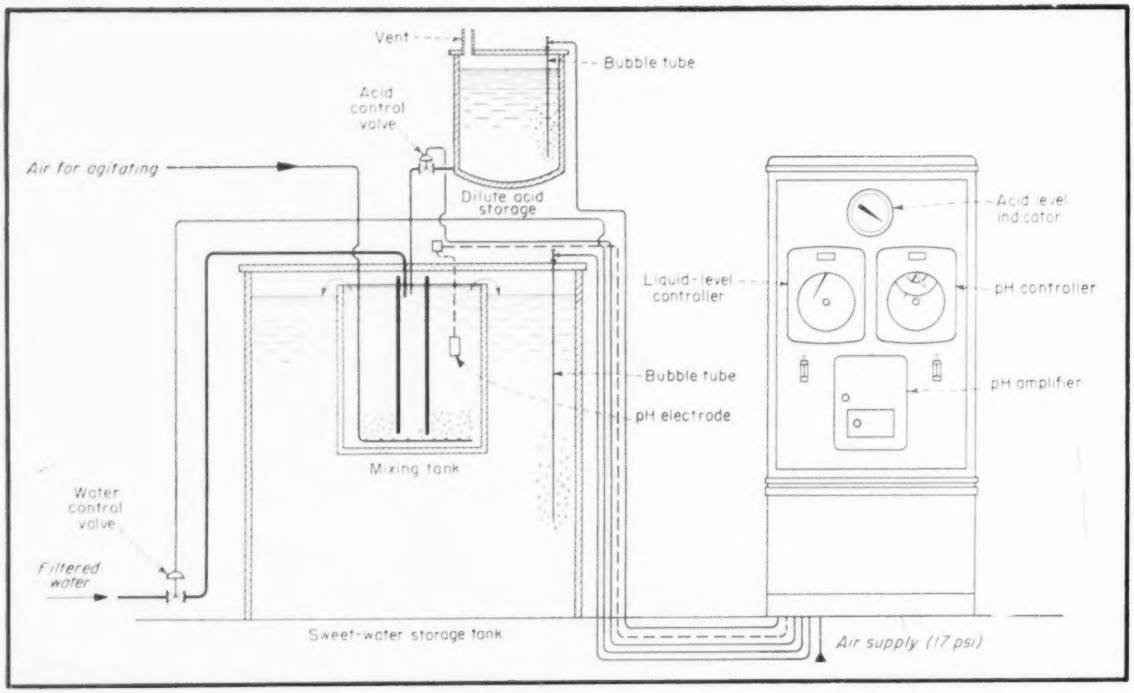






Stick Unit Closeups

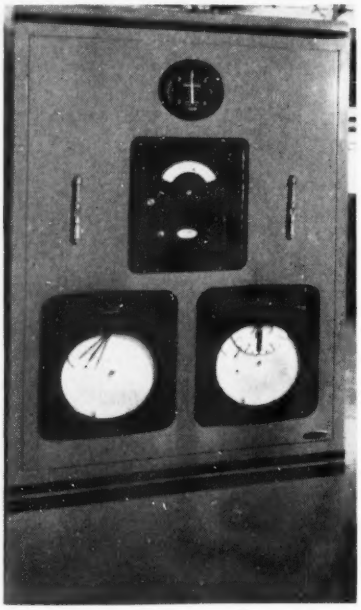
GRAM machine (above) automatically produces 300-doz.-plus stick novelties hourly with one man, two women. Pockets in table are filled with measured quantity of soft ice cream (1). Then, as table rotates clockwise, sticks are inserted (2) and frozen novelties coated (3). Umbrella-like frame (4), mounted on monorail, is used to lift out freezing table for cleaning. Extreme left photo: Closeup of sticking device. Left: Coated bars are automatically bagged, then hand-packed 3-doz. to carton.



INGENIOUS SYSTEM combines automatic pH and liquid-level controllers with special arrangement of acid, mixing, and sweet-water tanks. Connections to remote control panel are piped through copper tubing.

pH Control Ups Quality, Boosts Process Yields

Brewery holds process water within 0.1 pH by means of automatic system to remove damaging variable



CONTROL PACKAGE comprises neat assembly of controllers, amplifier, and indicator. It is located in brewery pump room.

FE STAFF

Water—as a prime ingredient in beer—has been under hawk-like scrutiny by brewing technologists in recent years.

Here's the reason: Some really sizable variations in yield and quality at certain stages of the brewing process have been tied down to the influence of minerals added by water. Hence, a selectively proper water treatment, plus an optimum pH in each stage of brewing, has invariably led to more and better product.

Engineered water-treatment, in many forms, is a widely used, easily applied technique. But pinpointing pH throughout the brewing process is a more involved and formidable control project. Thus, the recent development of automatic, wholesale sweet-water pH control is a valuable tool for the already overburdened brewmaster.

For the fact is that, while pH changes many times—from mashing to fermentation—top results at each stage and a proper pH in the final beer almost always follow if the initial pH of properly treated sweet water is closely controlled.

Let us focus on an advanced system of this type that has been installed in the Los Angeles plant of the Acme Brewing Co. for over three years:

In the Acme setup, a novel Foxboro-engineered pH control "package" has been utilized—with very minor changes and additions—in the regular sweet-water system. Resulting is a supply of treated water for brewing which can be set at any predetermined value from pH 6.5 to 7.8 over wide changes in the rate of flow.

Pick-Up Site Important

A primary problem facing the system designers was where and how to secure an accurate and dynamic pH measurement. Since control would involve a continuous, variable addition of a reagent, it was important that this be adequately mixed and retained by the system at the measuring site—otherwise a false or lagging reading could occur.

To achieve this accurate measurement and also an appropriate adjustment of water pH "en-masse," the already existent 20,000-gal. treated-water storage tank was set up as a sort of reaction "surge" vessel. At top level and inside this large vessel, a smaller overflow-type mixing tank was suspended to receive both incoming water and the controlled flow of dilute acid additive.

In this manner, a relatively intimate and rapid reaction, or pH adjustment, could occur due to the mixing tank's small volume. Yet a sizable supply of adjusted water would be available in the large surge tank to meet variable process needs.

Actually, the size of the small mixing tank was carefully determined in relation to the normal sweet-water demands of the brewery. Maximum production usually meant a drain of 400 gpm. from the system. Hence a 3,000-gal. insert tank was deemed necessary. This would provide a 7-min. retention time, which is adequate for a complete reaction of reagent with water, at maximum flow.

To provide acid reagent, a 400-gal. lead-lined storage tank was located above the sweet-water vessel. This furnishes, by pipe-fed gravity flow, 2 to 4 deg. Baumé dilute sulfuric acid.

Both the reagent feed and sweet-water supply are brought into the mixing vessel through a single 12-in. pipe running to its bottom. Thus, mixing occurs enroute and at the bottom of the tank and prevents a short-circuit of unmixed components in the overflow to the sweet-water surge vessel. Further mixing is also provided by the release of compressed air at the bottom of the tank.

Control Components

As the control system evolved, the immersion-type glass pH electrode assembly was suspended in the upper part of the mixing tank. This provides a measurement of the fully neutralized water that flows past to overflow into the surge vessel below.

The associated control instruments are attractively housed in a wired and piped cubicle in the brewery's pump room. Signals from the glass electrode are first pre-amplified by a highly sensitive Beckman pH indicator, and then are fed into a Foxboro Dynalog recorder-controller. This latter instrument then positions an air-operated needle valve in the dilute acid supply line to hold pH at the desired level.

Since the measuring lag of the glass electrode is almost negligible and its associated controller is electronic, an almost instantaneous response to pH changes is effected, and pH can be

(*Turn to page* 196)

Sterilizes Can Seams Separately To Cut Hot-Holding Time

Separate sterilization of can seams after filling and closing the container is reducing hot-holding time—and minimizing loss of vitamins and flavor—in citrus juices canned at Exchange Orange Products Co., Ontario, Calif., and Exchange Lemon Products Co., Corona.

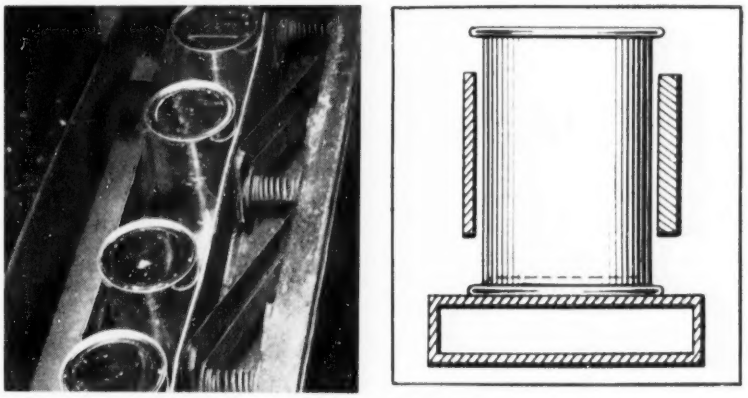
Quite simple, the method involves sliding the cans on end along a flat hot plate—by means of an endless belt which presses against the sides of the cans and rotates them against a fixed rail as they slide along. Or the cans can be rolled on their sides with the closure seams, or rims, rolling in heated angle-plates.

Previous practice was to depend upon the hot juice—which is at sterilizing temperature when filled into the cans—to sterilize the inside surfaces and end seams of the cans. But it takes longer for the heat to penetrate the seams and gasket compound than it does to sterilize the can body. Therefore the canned product had to be held at high temperature longer before cooling than it does now.

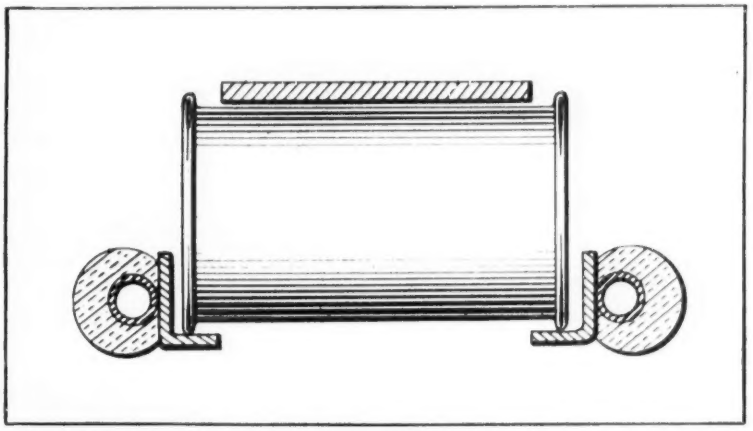
With the seam-heating technique, a seam temperature rise of 30 to 40 deg. F. is attained in about 10 sec. with a filled No. 2 can when the hot plate is at 320 to 420 deg. F. Product temperature is not appreciably increased, and a seam temperature at least 50 deg. higher than that of the product is attained.

Williard E. Baier, manager, Sunkist Research Department, invented the method, and patent is now sought.

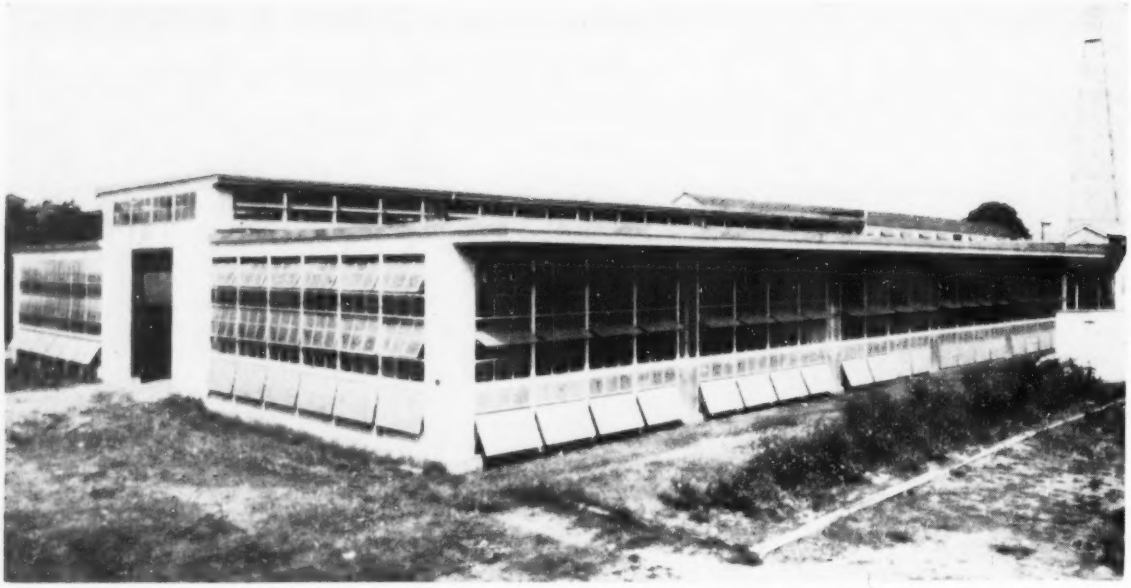
How Seams of Filled Cans Are Heated



CAN END AND SEAM are in contact with hot plate as can is slid along and rotated by belt (at right side of can). Diagram shows hollow construction of hot plate and cross-section of belt and guide rail.



END SEAMS ONLY are in contact with angle-shaped hot plates as can is rolled along by conveyor belt at top side of can.



WALLS of aluminum sash and broad flat ceiling surfaces make this new poultry processing plant easy to keep clean.

7 "Musts" In Sanitary-Plant Layout

High cleaning costs justify extra site-and-building outlays to eliminate rodents and insects, hard-to-get-at recesses, objectionable ceiling drip and odors . . . Here's how to go about it—from grounds and foundation on up

HOWARD L. STACKHOUSE
Chief Design and Construction Engineer, General Foods Corp., New York

Prime measures of a good food plant are its sanitation and cleanliness. Hence, where a good plant is the goal, your scheme of action should call for—

1. Location of the facility in an area unattractive to rodents and insects.

2. Construction of durable materials.

3. Elimination of rodent harborage and insect breeding on plant grounds.

4. Employment of every known measure for excluding rodents and insects from the plant.

5. Incorporation of adequate and acceptable waste-disposal means.

6. Applications throughout that make for ease in cleaning, and

7. Creation of appearance values that encourage employees in habits of cleanliness and pride.

These seven requirements pose a difficult task for the building designer. But present costs of food plant sanitation—estimated at 7-12 percent of plant's labor bill—certainly justify expenditures for refinements aimed at making sanitation and cleanliness easier and less expensive.

Where and How

From a sanitation standpoint, plant location is concerned with availability of adequate supplies of potable water, economical and legally acceptable means of waste disposal, and compatibility of the plant and its neighborhood.

Swamps or garbage dumps, for example, would not be acceptable to the plant, nor would a luxury neighborhood willingly accept a packing house.

Having selected a site, the equipment layout must be determined before building design can be started. The question of whether the plant shall be of one story or several stories is usually decided by the cost of real estate or nature of the process or both.

To get the most economical layout, necessitates the technical and economical examination of many alternates if the operation is other than a very simple one.

These studies should, among other things, consider the importance of avoiding contaminating contacts of raw and finished products. Raw materials, for example, should not be stored or conveyed unnecessarily through areas where foods are being processed and packaged.

Plant Grounds and Foundations

Areas surrounding the plant should be graded for quick run-off of surface water to eliminate the possibility of swampy spots. Entomologists have determined by radioactive techniques that house flies may move as

much, but seldom more, than a mile from their breeding place, and then markedly in the direction of unsanitary locations.

Wooden walks are to be avoided as potential rodent shelters. Cinders, gravel, or concrete are used instead.

An incinerator provides means of getting rid of dry wastes promptly—for both good sanitation and fire prevention.

At least a limited amount of well kept landscaping promotes employee pride in the plant and, in turn, habits of cleanliness in the working areas.

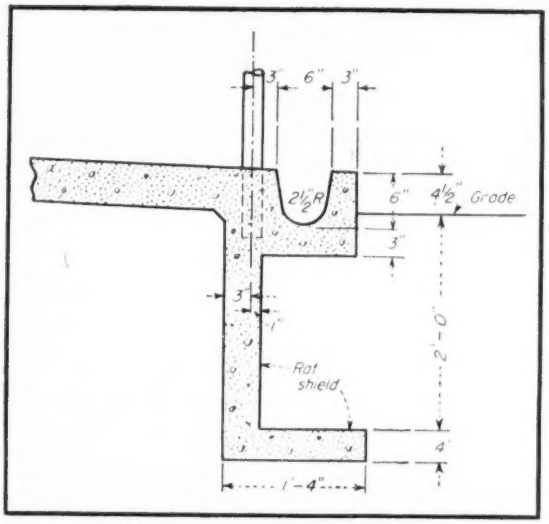
Design of the foundations should be left to competent engineers. Inadequacy results in settling, which produces or magnifies floor drainage problems, cracked walls that create leakage and insect problems, and in some cases roof puddles that can be centers of fermentation, decay, and insect breeding.

There should be rodent-proofing here. For example, to keep rats from entering by burrowing under, foundation walls should be at least 2 ft. deep with a footing extending outward 1 ft.

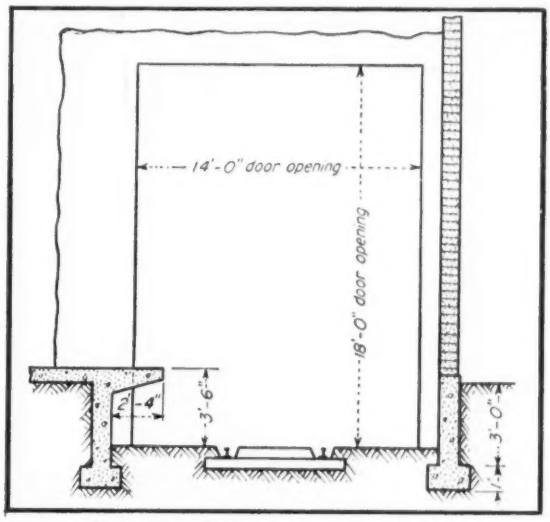
In temperate and colder climates, good design takes care of the problem in carrying footings 3 ft. or more down to get below frost. In fact, it's fortunate that the well designed industrial building of today is automatically laid out to incorporate many rodent exclusion features. Moreover, these same features are also commonly desirable from a fire prevention standpoint. The trend toward non-combustible building materials is an important example.

The lowest floor of modern processing buildings is poured directly on the ground, except where local conditions make crawl spaces necessary. These are either permanently closed by masonry or are fitted with metal screens (maximum openings ¼ in.).

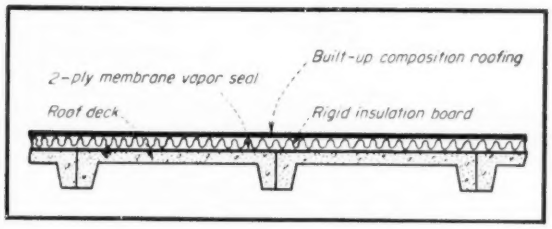
Proper Construction Aids Sanitation

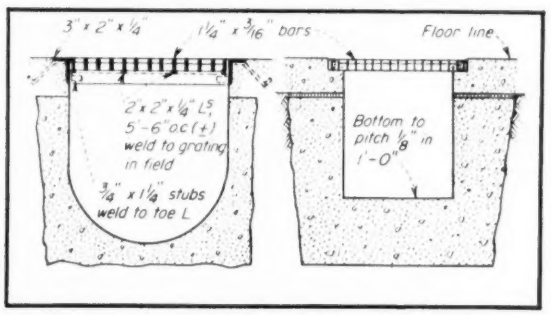


DRAIN FLUME and properly constructed shield keeps rodents out of animal research area.

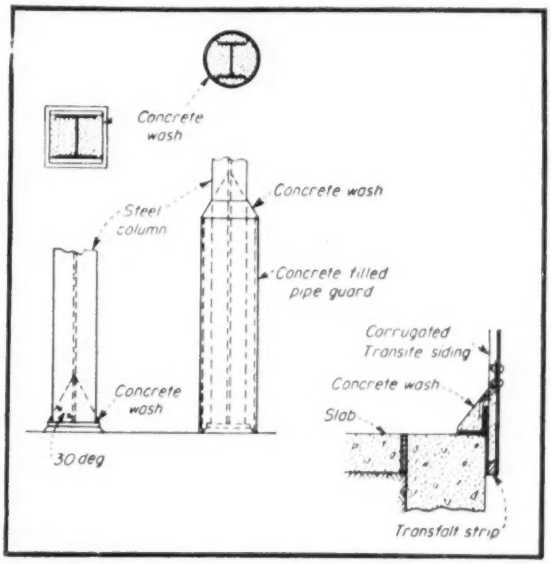


OVERHANGING carloading dock prevents rodents from climbing to warehouse floor.



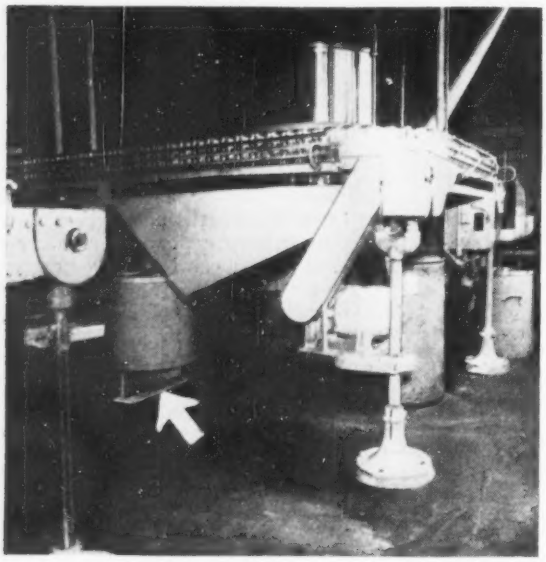


WELL designed roof (top) incorporates insulation and vapor seal. Above: Floor drain (right) permits accumulation on shelf that supports grating and in sharp corners at bottom. Design at left eliminates these objections.

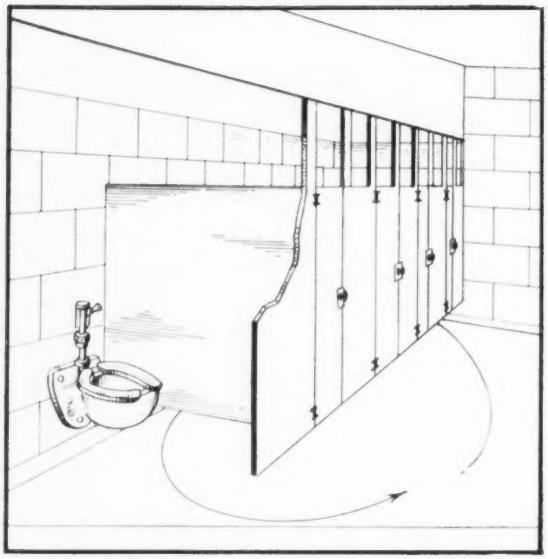


HARD-TO-CLEAN sharp corners of H-columns are eliminated (left) by concrete wash. Right: A cleanable junction is obtained between corrugated siding and floor by filling with concrete or with filler blocks.

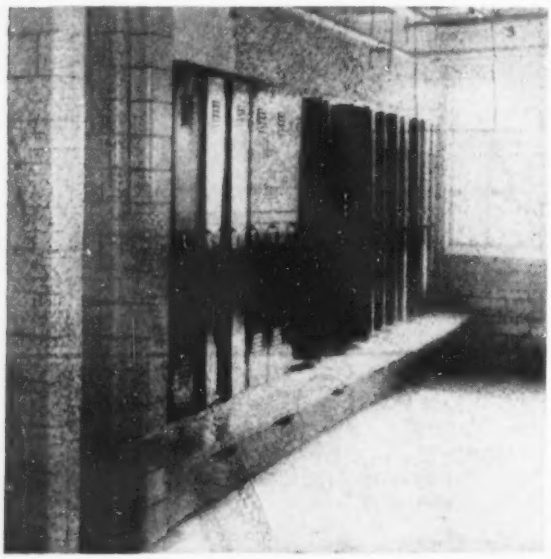
Careful Design Makes Cleaning Easier, Better

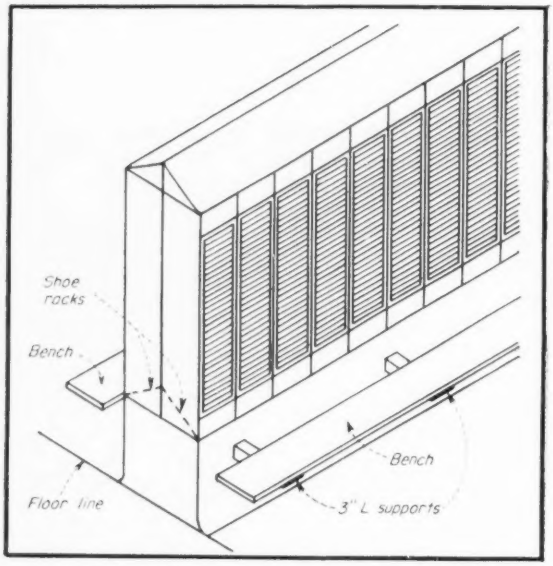


HERE, single pipe stands under can conveyors (rather than dual legs) and I-beam support under dirt trap (arrow) speed cleaning job.



WALL-HUNG toilet fixtures and ceiling-hung partitions make washroom mopping job relatively easy, insure greater cleanliness.





LOCKERS that rest on masonry bases, have built-in benches, and plaster partitions extending to ceiling (left photo) or sloping tops (sketch right) eliminate litter-catching and hard-to-clean areas.

It's also important to insure adequate design of the building's structural frame by putting it in the hands of registered engineers. In most localities the law requires that this be done.

Structural Frame

Concrete is generally a most satisfactory structural material in that it can be made almost entirely free of hard-to-clean recesses and corners. Flat slab design gives an essentially uninterrupted ceiling, but beam and girder construction is more practical when the nature of the operation necessitates more or less frequent cutting of holes for process changes (from a structural aspect, the flat slab is the more seriously damaged by such cutting).

Economic considerations, however, often dictate the use of structural steel. Here, the best design is in simple beams and columns rather than in built-up members which, by their nature, contain inaccessible voids and corners.

On the point of sanitation, wood should be limited to dry areas and is preferably employed where there is no insect problem. The preferred wood construction is the so-called "mill type," in which beams are about 5 ft. on centers. The common joist construction is hardly justifiable in a food plant.

For normal or moderate exposures, roof deck selection can usually be determined by price within the limits of structural soundness.

Roof decks over wet processes, however, should be selected for resistance to moisture and chemical attack, espe-

cially in cold climates. Reinforced concrete, precast concrete plank, and preservative impregnated wood decks have been used. Reduction of condensation and of its adverse effects in sanitation, working conditions, and structure life requires an effective roof insulation.

Preservation of the insulation material itself demands an impervious vapor seal between it and the roof deck. Without a seal, water vapor migrates into the insulation, saturating it and soon destroying its usefulness.

Impregnation by a preservative treatment will retard decay of wood decks in wet areas. In the event both preservative treatment and insulation are omitted, condensation can quickly saturate the plank, encouraging rapid rotting. When preservatives are used they must be selected for acceptability in the food processing areas. Objectionable odors or contaminated ceiling drip must be avoided.

Hooding Saves Roofs

Where vapor releasing equipment contributes significantly to wet area problems, it is important to hood such operations and to exhaust them so that water vapor does not escape within the building. Where equipment has traditionally been operated in the open, strong opinions may be held that hooding is impractical. But there have been a great many successful applications.

The gracefully shaped hood that covers practically every brew kettle is a good example. In a tight hood of this sort there is much less fog or steam to obscure the operation, which can then be observed through heavy glass windows even better than if there were no cover. Such hoods often make remarkable improvements in sanitation, working conditions, and ease of operation.

The most economical roof surface for conventional jobs is tar and gravel construction, and it is advisable to buy a roof bonded for 10, 15, or 20-yr. life when bonding is available.

A process that discharges dusts or other materials on the roof, however, introduces a cleaning problem that is seriously complicated by a gravel coating. One solution is to substitute an asbestos felt for the conventional rag felt and leave it bare for easy sweeping or washing down. Another answer is the use of a metal surface. Sufficient pitch (at least $\frac{3}{8}$ in./ft.) should be provided to avoid puddles.

Concrete floors are the most universal type. But they can vary from excellent to bad, depending on the knowledge, skill, ability, and integrity of the flooring contractor—and whether or not the owner has, through his architect, specified a good floor to begin with.

Concrete is no better than its aggregate, and suitable material should be shipped in when the local product is of poor quality. A good floor requires dry mixed concrete. And because the average cement finisher prefers a wet mix, constant supervision and especially skilled personnel are required to insure a good job.

Tile Floors Preferred

For maximum resistance to chemical attack, a good, hard burned red tile floor is widely used. Though expensive, it is the most economical in the long run for many applications. The currently available resin cements will usually give long life. Here again, skilled contractors are essential if the floor is going to be durable, flat, and free from low spots.

Wood seldom makes the best food plant floor. In dry areas, cracks accumulate dirt, which tends to sift through to the floors below. Cracks can also harbor insects. Sifting can be reduced by a layer of heavy paper between the sub and finished floors.

Wood is definitely unsuited to wet areas and is damaged by water mopping, but in dry places it can be established and maintained in good appearance by using penetrating finishes that are commercially available and by periodic dry cleaning with floor machines and steel wool.

Magnesium oxychloride cements, obtainable under a variety of trade names and in a variety of formulations, offer correction for many inadequate floor conditions and, in some instances, make excellent initial installations.

Wet area floors should be pitched at least $\frac{1}{4}$ in./ft. to points of drainage. But here, again, flatness is important. Curved coves should be used to join the floor with the wall or concrete baseboard.

Processing requirements sometimes call for pits to house various equipment. These can produce such serious cleaning and sanitation problems that some managements even forbid their use.

An acceptable pit should be easily accessible, large enough to get around in, and provided with good drainage, lighting, and ventilation. A pit so small that it can only be cleaned from a prone position on the floor will probably stay permanently dirty.

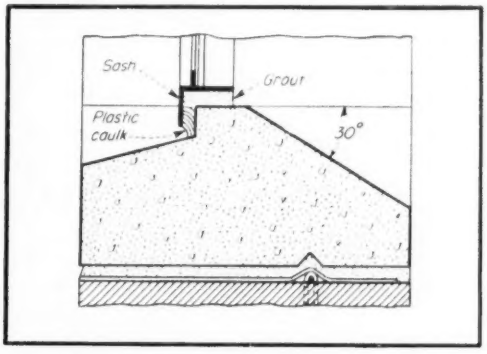
In multi-story buildings where piping, spouts, chutes, or other equipment, must be run through the floors, sleeves or curbs should be installed at every such opening. Sleeve height should be from 2 to 6 inches. Pipe sleeves are good for smaller openings. In larger ones, either a poured-in-place concrete curb, or a sleeve of $\frac{1}{4}$ in., or heavier, steel plate is effective.

Equipment Supports

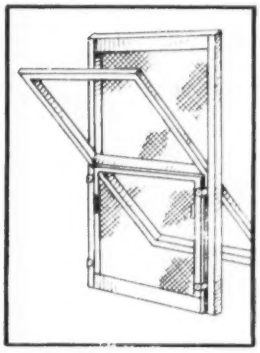
Cleaning is easier and appearance is better if equipment stands, bases, and other interferences at the floor, are kept to a minimum. They should be at least 3 ft. apart to permit easy use of brooms and mops. Drives, operating platforms, seats, and other accessories, can often be supported directly from equipment or building structure to avoid the necessity of carrying them to the floor.

Conveyor frames can be designed with beam strength for long unsupported spans to reduce the number of supports. Bases and supports that must rest on the floor can be made with smooth surfaces that will not trap dirt.

Tubular supports, instead of angles or channels, eliminate hard-to-get-at corners inherent in structural members. In addition, tubular supports can often be made large enough to permit the use of one support instead of two. In dairies and other wet-food operations where sanitation is of highest importance, ball feet with no anchorage are very effective.



CORROSION of metal sash is minimized by beveled sill that permits caulking to exclude moisture, and makes bottom accessible for repair.



WINDOW WASHING task is eased by center-pivoted sash that uses flat screens.

Diagonal (or X-type) bracing can often be avoided both in the building structure and in equipment supports in the interest of both appearance and ease of cleaning. It is usually possible to build adequate strength into a structure by the substitution of gusset plates for diagonal members.

Walls

Tile walls are high in first cost but often worth the money in lowered cost of cleaning, painting, and sanitation. Vitrified tile in white or colors is excellent where the utmost is demanded, but salt glazed tile in its natural tan or buff color is also good. Cost can be reduced when exposure permits stopping at wainscot height, though there is often strong preference for full height in wet areas.

Poured concrete, finished with plaster or Keene cement and painted, makes a satisfactory wall and a good concrete can take a coat of paint. However, cost of maintaining painted surfaces has resulted in some installations of smooth finished bare concrete, which is easily cleaned. Appearance painting is especially costly and not very satisfactory in wet areas.

Wood will continue to be used in dry areas, and here good oil painting is usually indicated, as is treatment with insecticides. Corrugated steel and Transite create voids that are impractical to clean. But this can be corrected by filling with concrete or with filler blocks.

For storage areas, concrete block, tile, or brick, either bare or painted, are generally satisfactory, provided all voids are closed to rodents and insects.

Locker and Washrooms

In toilet and washroom design, two features are of special interest. The first is use of wall-hung fixtures and ceiling-hung partitions.

When equipment is floor mounted, the many obstructions make mopping a slow, tedious job and, even when janitors are especially conscientious, the work is not done as well as it would be in the absence of the obstructions.

Second feature is the mounting of lockers. The following methods have proved suitable: (1) A built-in arrangement wherein the lockers rest on a masonry base and have a plastered partition reaching from their top edge to the ceiling, with the blind spaces above the lockers ventilated; (2) lockers installed on a masonry support with the tops open and sloped to prevent accumulations; and (3) lockers supported on a structure that bears only under their edges, leaving bottoms entirely open for good ventilation and ease of mopping. The latter is low in first cost and permits easy rearrangement, or movement to another area for re-use.

Windows

Metal sash is employed extensively, though it has its own problems, the first being corrosion of the bottom member where it rests on the sill.

This is minimized by resting the sash on a step instead of in a groove, as formerly. The step also permits caulking for exclusion of moisture and makes the lower sash member accessible for repair when necessary. Sill is sloped on the outside for drainage, and inside to prevent accumulations.

Ordinary center-pivoted sash is screened, when necessary, with an expensive semi-cylindrical arrangement that accumulates dirt on its upper surface and complicates washing of the window.

A center-pivoted variation that permits use of effective flat screens is now available. Its price is a little higher, but the cost of screening is much less than with the older type. Sash can be operated through a small door or with an underscreen device, which is preferred by some. This type has the further advantage of better safety in locations where the interior projection of a center-pivoted sash would constitute a hazard.

Corrosion-resistant sash is available today in both galvanized iron and aluminum at cost premiums usually recovered in elimination of the first two or three paintings.

Glass block is also increasingly used and is satisfactory for many applications.

Generous light and ventilation encourage good housekeeping, so for the majority of applications, large window areas and ventilator panels are desirable. To the extent that glass block limits ventilation, its desirability is decreased, except in those areas that are provided with artificial ventilation.

Cleaning

Central vacuum cleaning is used in many dry operations. And such systems are best installed when the building goes up. To be fully successful, an adequate dirt receiver is essential, and it's preferable that the dirt removal be automatic. Vacuum cleaning is not yet universally accepted, and there's nothing that will discourage its introduction more than having to spend excessive time in disposing of collected waste.

—End—

Raises Yield, Halves Labor

—Continued from page 61

discarded pomace. Then there were other losses, such as that of sugar not recovered by the simple stem washing operation.

New Way Described

The new system elevates the grapes to a pre-breaker. This unit, housed in a closed trough, consists of a central shaft equipped with a series of hammers, attached to the shaft in the form of a helical screw. It receives the grapes from the elevator and, in a preliminary way, breaks up the heavy stems and simultaneously conveys grapes and stems to the disintegrator.

From the disintegrators, the must is pumped to fermenting tanks. When a tank is about half-full, draining of the free-run juice is begun. Tanks are drained continuously. It is to be noted that a 24,000-gal. tank can be used for 250-300 tons of must.

After all free-run juice is withdrawn, the pomace is flushed with water and pumped directly to agitator-equipped distilling-material fermenting tanks. This water-pomace mixture is fermented, then pumped to a pomace still. Following distillation, the slops are pumped from the still. About ten volumes of water are added and this mixture pumped to an irrigation system.

150 Ton/Hr. Capacity

Two Reitz disintegrators (Reitz Mfg. Co., Santa Rosa, Calif.) are now installed at Perelli-Minetti's. The Model R-D-18, with an 18-in. screen having ¼-in. perforations, has a capacity of about 150 tons of grapes an hour. It is powered by a 150-hp. motor and operates at 3,600 rpm. Where necessary, these units are constructed of stainless steel in accordance with the winery practice of eliminating from equipment the metals which corrode or which contaminate the product and deteriorate quality.

End (*Resume reading on page 62*)

Planning Means Savings

FROM EQUIPMENT RECORDS which list vital information about every unit, periodic inspections are planned and weekly work schedules drafted. Here in Nabisco's Portland, Ore., bakery, Mechanical Superintendent Kershner (left) and key personnel slate the work ahead.

PREVENTIVE MAINTENANCE

Minimizes Costs, Clinches Output, Promotes Quality

PART I—How to set up proper program . . . Details of the inspections . . . Records

GEORGE J. MARTIN

Manager, Mechanical Division, National Biscuit Co., New York City

Experience has demonstrated that a *sound* preventive maintenance program not only reduces actual maintenance costs but also makes possible the following twelve additional benfits:

1. Security of production, based on the fact that equipment is in good operating condition at all times.
2. Better work control through scheduling of the maintenance.
3. Improved control of spare parts through determination of requirements from inspection records.
4. Reduction of mechanical downtime by scheduled periodic inspections.
5. Increased life expectancy of equipment and buildings.
6. Promotion of product quality control through uniform and constant operation of properly adjusted and maintained equipment.
7. Economical use of maintenance personnel.
8. Higher morale of workers through their clearer understanding of the duties.
10. Complete knowledge of job costs and routine maintenance expenditures.
11. Proper lubrication, on a systematic basis.
12. Greater confidence in the maintenance organization's ability to keep the plant running—on a three-shift basis if necessary.

A practical high performance program can be developed to suit your particular needs by planning along fundamental lines. The principles are covered by these seven forms:

A. Equipment Record
B. Inspection Records
C. Work Orders
D. Maintenance Time Cards
E. Storeroom Withdrawal Order
F. Monthly Report of Preventive Maintenance Inspections
G. Mechanical Downtime Report

The following review of the above forms, outlining their use and purpose in the program, will serve as a guide for plant engineers who are projecting preventive maintenance.

First requisite is the *Equipment Record*, completely covering *all* equip-

WHAT, WHY, AND HOW OF PM are spelled out in detail in this special two-part feature article prepared from the author's address at the recent Plant Maintenance Show in Cleveland.

The initial installment covers benefits gained and working forms employed, along with all the practical fundamentals.

Concluding Part II, to appear in April FE, will give pointed data on effective personnel selection and training, employee meetings and equipment manuals.

After Versus *Before*

BREAKDOWN MAINTENANCE—Is very expensive, highly inefficient, hobbles production.

This is the "after-the-trouble-is-done" way of doing it—repairs to machinery and equipment only when a failure occurs during the production period. Such repairs are generally limited to measures that will get the equipment back in working order quickly.

PREVENTIVE MAINTENANCE—Is the sound, logical, proved-by-test-and-experience system

Here, the checkups and work on machinery and equipment are carefully planned and scheduled—to assure maximum efficiency and production with existing units at all times. Breakdowns and shutdowns, that cause costly interruptions of production, are prevented from happening by systematic prior inspections, adjustments, and repairs.

ment to be maintained and controlled.

To identify each unit properly, it is necessary that an equipment inventory number be assigned to each. This number can be stamped on a metal tag and attached to the unit for permanent identification.

The inventory of equipment will be simplified if a mimeographed form is prepared, with space for listing the general data desired and special information. These sheets can be compiled by area mechanics, electricians, or trainee engineers.

In some of our plants, we have assigned the inventory work to our maintenance clerk so that he could become fully familiar with all of the equipment and be in a better position, when the program is in operation, to handle the various specific reports.

Completed inventory sheets should be reviewed by the plant engineer, who can add any additional data that may be of value on the permanent equipment records which are typed from the inventory sheets.

The equipment record should be properly designed to cover all possible reference data for all plant equipment, and it should indicate the assigned inventory number and location of the unit.

The form should record all pertinent name-plate data, description of equipment, serial number, manufacturer's name and address, purchase order number, bearing data, and lubrication data.

Space also should be provided for listing essential replacement parts that are to be stocked in the maintenance storeroom. This list is carefully checked by the plant engineer, who sets the maximum and minimum quantities of parts to be carried in stock. When a large variety of parts is to be carried, the requisite extra sheets can be attached to the equipment record.

The reverse side of the record is used for a physical history recording the repairs and changes, indicating the work-order number, type of repairs or changes made, labor and material costs.

After the records are in use for some time, the history of repairs and changes will indicate whether the equipment is functioning properly and on an economical basis, or if the equipment is too small, too weak, or of the wrong size and type.

"Applicable to All"

For many years, plant management tended to overlook methods available for controlling and reducing maintenance expenditures, fearing that installation of such new programs would develop greater costs.

But such fears have been proved groundless. Conversions to preventive maintenance multiplied. And today there is a wealth of cost data indicating PM gets both results and savings.

True, a comparison between a breakdown-maintenance plant and a preventive-maintenance plant may occasionally show a lower operating cost for the former. But this type of comparison can be misleading. Making repairs only when a breakdown occurs may result in lower cost for a short period of years. However, the person in charge will come to realize that eventually only major repairs and overhauling, at great expense, can give management anywhere near the equipment life anticipated.

Such major expenditures will finally result in greater average cost per year than that of a comparable plant using PM, where costs are more uniform and equipment life longer.

Size of plant or number of maintenance employees are immaterial. We have successfully installed programs in plants where maintenance personnel ran all the way from 3 to 250. Only difference has been that smaller plants have a minimum amount of paperwork.

In plants on a 3-shift, 6-day basis, a combination of breakdown maintenance and preventive maintenance is sometimes used due to inability to shut down vital production units. However, such practices are avoided where possible by carrying spare parts, equipment sections, and in some cases complete units for making rapid replacements.

In some process fields where operations run 24 hr. per day, 7 days per week, there are greater difficulties in setting up a good workable program. Nevertheless, the problems can be analyzed and a preventive system shaped to suit the conditions. A selected-date shut-down schedule of individual lines for inspection and repairs is a solution.

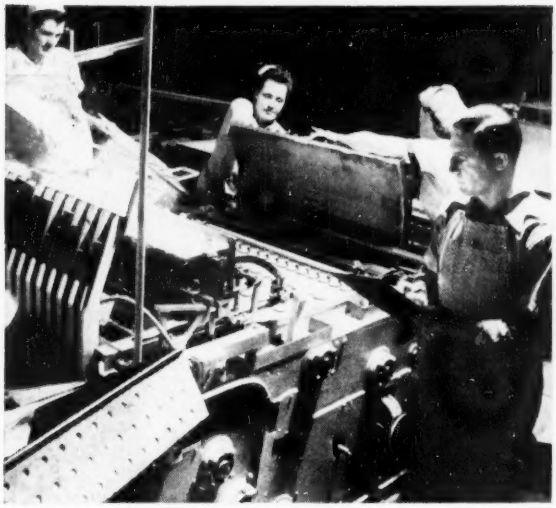
It is my opinion that PM is applicable to all. In short, *any* plant can operate its maintenance organization more efficiently and more economically by using it, since scheduled production and prolonged life of equipment are thus assured. Accordingly, the plant engineer, in his function of advising management on the most economical and most efficient maintenance program, should sell management on PM.

Benefits of a realistic program cannot be obtained unless management is fully sold on its merits. Efforts to use preventive maintenance by selling the mechanics first and management last only encourage failure.

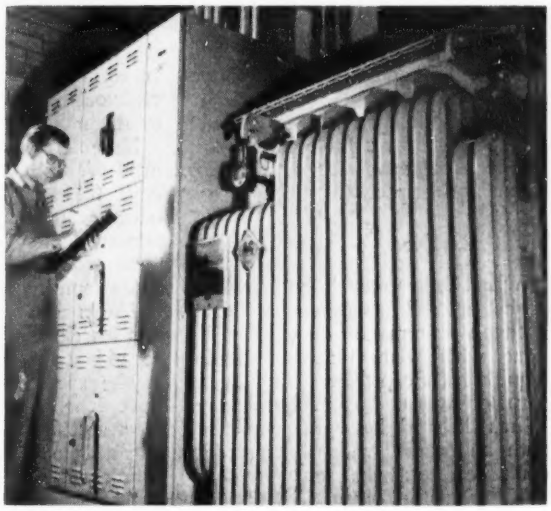
When management fully approves, the plant engineer should then make every effort to bring his maintenance foreman and leadman into accord before installing any phases in which the mechanics take part. The results and success depend upon the coordinated effort of everyone down the line.

To review the entire program in advance with union representatives is also important—so that possible complaints will be forestalled. Management, at this point, should also review the entire program with top production supervisory personnel. Their full familiarity with the equipment employed, its capacity and volume, and any weak spots in the setup, made their cooperation essential.— ***The Author***

'Running' Checks: Mechanical . . . . . and electrical



COOKIES KEEP COMING—no output lost—during this inspection. Loose parts, lubrication needs are revealed.



POWER substation receives periodic checks to prevent possible electrical failure shutting down operations.

Value of this record is almost limitless. In case of a breakdown, the plant engineer can get accurate machine and parts specifications immediately, the name and address of the manufacturer of the equipment, purchase order and date, and other pertinent information. Whether the question covers size, weight, lubrication, current characteristics, or other operating data, the essential details are there in black and white.

After all the equipment is catalogued, the sheets can be filed in loose leaf binders, indexed by departments, buildings, or type of equipment for quick reference.

Use of a prefix letter before the inventory number—to facilitate reference to specific types of equipment—has been found helpful. This practice is a big time saver in plants having many pieces of equipment.

The file should be started as soon as possible. It is the basis for obtaining the frequency data for inspections and lubrications, which can be indicated in a tickler section on the right-hand side of the form.

Findings Noted

Next in line are the *Inspection Records*. These comprise a group of forms specifically designed for recording and reporting the findings of the maintenance inspectors.

Each record covers a particular class of equipment and contains a pertinent list of inspection points to be checked by the mechanic making the examination.

It is desirable to develop similar forms to cover the various types of equipment in your plant. The information can be compiled from equipment records, the selection being made by the plant engineer by carefully considering the location of the equipment, its value in maintaining production, frequency of inspections, and maintenance workload.

The number of inspection record forms should be kept to a minimum. Inspection of unimportant equipment too frequently can decrease interest and thereby morale, and so reduce benefits.

Of Major Importance

Actually, inspections are the most important phase of the programs. Made at the proper intervals, they insure against mechanical breakdown, particularly during production periods. For our requirements, we have two types of inspections—running and shutdown.

The former are made on equipment that cannot be shut down for more complete detailed inspections. The term "running inspection" implies that the unit was operating during the check, or that the examination was limited and not a thorough job covering all parts. Units in operation can be given only a "running inspection" to locate loose parts, vibration, misalignment, wear, lack of cleanliness, poor lubrication, and faulty operating condition.

Shutdown inspections are made on equipment that is idle. They involve a thorough scrutiny of all working parts that can be checked without dismantling the equipment. Examples are parts that are concealed or in motion during operation. There should be included such items as bearings, gears, shafts, collars, set screws, pins, belt tension, belting, and lubrication.

Shutdown checks are much more desirable. But where equipment is in operation on a three-shift basis, it is quite likely that "running" examinations will be made more frequently.

The plant engineer should exercise good judgment in the selection of the type of inspection. The general condition and age of the equipment are determining factors on the type and frequency necessary. We have found that at least every third inspection should be a shutdown.

The routine should also include making machine adjustments and minor repairs—provided the time required does not exceed 15 min. per unit. This procedure will eliminate delays, reduce repair costs, and make breakdowns infrequent.

Job for Mechanics

All mechanical equipment inspections should be made by assigned mechanics. In many of our plants area mechanics or night shift mechanics fully familiar with the equipment do this work. Assignment of mechanics fully acquainted with the equipment is very important. Their knowledge makes them more qualified to locate machine weakness and worn parts and to recommend replacements. As a check, and to insure complete coverage, the same mechanic should not be assigned to make any two consecutive inspections on the same equipment.

In short, it is not desirable to call upon only one mechanic—even if he is capable—for general inspections on all types of equipment. Rather, these examinations can be used to advantage

for building up the knowledge and ability of a number of persons for these tasks. The mechanic's helper should never be sent to make these inspections, since their familiarity and skill is limited and their reports would be of little value.

Electrical equipment checks should only be made by capable electricians, in the same manner as outlined for mechanical inspections.

What's Involved

Work Orders provide both maintenance staff and management with the necessary information on work to be done. From data thereon, material requisitions are prepared, and assignment of tasks to personnel are made. When the work has been completed, with all entries made, these orders comprise records that serve the plant engineer in his control activities and the cost department in expense allocation.

Many types and varieties of work order forms were examined before the one we now use was developed. This present form serves many purposes. Orders are made out by production as well as maintenance personnel, and accordingly a separate space is included to indicate the item and work wanted.

For example: A production supervisor may jot in this space what he thinks is required; but the mechanic making the repairs indicates specifically, in the space provided, the changes or repairs actually made. The latter may differ radically from the original diagnosis. Space should also be provided to indicate whether the job is routine, urgent, or can be done only during a shutdown.

Type of maintenance personnel required is also shown. Time spent by the man assigned is recorded on the reverse of the order, and the summarized labor cost is posted on the bottom of the front side. When a job is completed, the order becomes important historical data from which can be obtained considerable information about previous repair and installation jobs.

Closed out work orders should be reviewed every six months to put the finger on repetitive repairs. All such closed out orders should be kept in the files for a period of one year. Reference to those more than one year old is seldom made.

The person originating the order should fully describe the work. The plant engineer can then determine the job importance and establish its priority.

All orders are submitted to the maintenance office. Here, the clerk assigns a number to the form and submits it to the plant engineer for approval. The engineer makes the assignment and does the scheduling.

In case of a breakdown or emergency, mechanics are sent out on the job immediately and the work order is made out by the maintenance clerk or by the maintenance supervisor.

If more than one department is involved, separate work orders are made for each job. If two or more trade groups are required on one job, separate orders are issued to each trade group. However, the number is the same for each such group.

The mechanic handling the work lists his clock number and the number of hours worked, and he describes, in the space provided, the type of work done. As for materials required for a specific job, the mechanic submits a signed and approved storeroom withdrawal slip to the maintenance clerk or storeroom clerk.

All work done by the maintenance crews, with the exception of mechanical adjustments and minor repairs requiring less than ½ hr., must originate with a maintenance work order. Maintenance labor under ½ hr. is charged to standing work-order numbers.

The plant engineer maintains a complete file of active orders. If information submitted on an order is incomplete, the person who made it out is contacted, and corrections are made before the order is issued to the maintenance mechanics. All orders on completed jobs are turned in to the maintenance clerk, who screens the data, checks on the satisfactory completion of the job, and then passes the order on to the plant engineer for closing out the job.

The maintenance clerk summarizes the labor and material costs of the work and posts these charges on the equipment record sheet covering the specific equipment on which the work was done.

Work orders are made out in duplicate, both copies being submitted to the maintenance office. If a production supervisor making out the order desires a copy for his file, he prepares the order in triplicate, retaining the third copy. Upon receipt of the order, the maintenance clerk stamps a number on both copies. Original is retained in the maintenance office for follow-up; duplicate is assigned to the maintenance personnel.

Work order numbers are started at the beginning of each year and run consecutively until Dec. 31. On Jan. 1 the sequence is started over again for the new year.

Standing work orders have been developed for all of our plants and are used to eliminate the necessity for repeated issuance of individual work orders for routine maintenance work done at regular intervals. Covered are routine maintenance, machine adjustments, and repetitive jobs such as replacement of fuses and light bulbs, lubrication, equipment cleaning, and other items of this nature not assigned individual work orders.

In setting up the standing work order numbers, we reserve the first 50 numbers at the start of each year to cover a standard list of repetitive maintenance operations. This list is regulated by the plant engineer, who assigns numbers to the respective maintenance operations.

The same standing numbers, representing the same maintenance work, should be used without change each year if possible. This enables maintenance mechanics to memorize the numbers and directly associate them with the specific type of work.

We also have found the use of these standing numbers ideal for recording routine maintenance costs by departments, type of equipment, or specific operations.

Simplicity Cited

Our work order system is really simple, and we have learned that the small amount of time required by the mechanic or maintenance supervisor to list the job information on the order contributes greatly to good control and efficient maintenance operation.

Now to *Maintenance Time Cards*. These were developed to tie in directly with the entire program. Spaces are provided to indicate mechanic's name, clock number, work order numbers, nature of jobs assigned, and data as to regular hours and overtime.

Work orders indicate the maintenance labor expended on regular jobs. The maintenance time card is the only record of the labor expended on standing work-order numbers and special work not covered by any individual order.

Success of the maintenance department depends greatly upon having a storeroom with sufficient quantities of spare machinery, equipment parts, and supplies.

In each of our plants we have a well stocked storeroom so that we can be well assured of meeting any emergency.

The *Storeroom Withdrawal Order* is used by all of our mechanics. Parts are priced from data on the perpetual inventory, and the withdrawal order is then passed on to the maintenance clerk, who attaches it to the work order for which the material is to be used.

Upon completion of the work order, all storeroom withdrawals charged to

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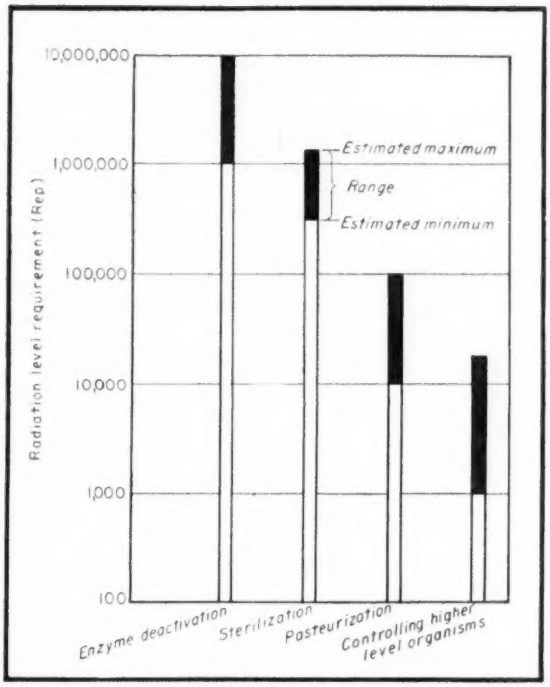
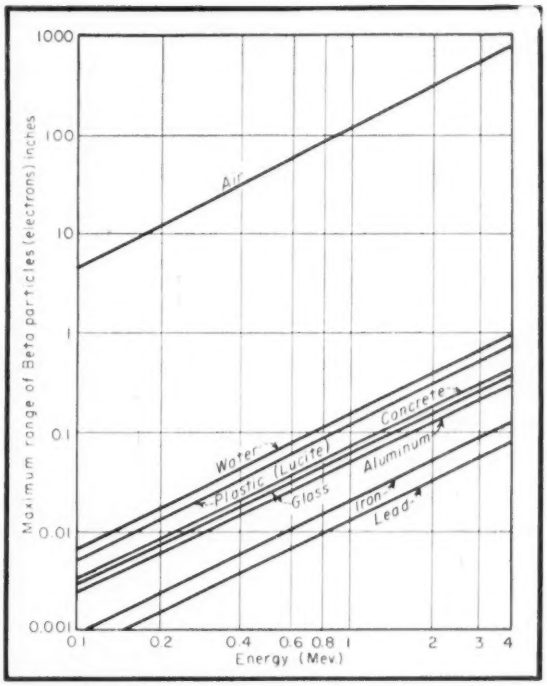


RADIATION NEEDED to kill organisms. Sterilization takes ten times as much as pasteurization; enzyme destruction, several times that for sterilization.



PENETRATION of electrons (beta particles). Million-volt beam goes through 0.1 in. of water. While X-rays penetrate 15 in., they are costly to produce.

Facts About Cold Sterilization

Ionizing radiation destroys bacteria easier than enzymes. Food quality sometimes is affected. Research is expected to solve technical and cost problems

W. M. URBAIN
Research Laboratories, Swift & Co., Chicago

PART II

In Part I of this discussion about a challenging new tool of food sterilization, methods of generating the radiation were explained (FE Feb. p. 45). In this concluding article, effects of radiation, and costs, are covered.

Experiments on the effect of electrons on bacteria were performed in 1926 by Coolidge, inventor of the modern X-ray tube. Using 90,000v. electrons, he found that *Staphylococcus aureus, Escherichia coli, Bacillus prodigiosus,* and *Bacillus subtilis* were killed.

Since these early experiments—and especially in recent years—there have been a great many investigations of the effect of radiations on bacteria and other organisms. Excellent data have been developed by Dunn, Campbell, Fram, and Hutchins with the Van de Graaff generator at M. I. T., and by Huber with the Capacitron.

In killing bacteria, it has been observed that vegetative types are more easily destroyed than spore formers. In some instances, three or four times the radiation required for vegetative forms is needed to kill spores. The amount of radiation required to obtain sterility, therefore, is somewhat dependent upon the type of organism present.

From the nature of the process, it appears that equal doses of radiation kill a certain percentage of the organisms present, regardless of the total. This makes the destruction of the last few organisms very difficult. Consequently, the determination of the sterilizing dose has been the subject of much study. Also, it is very important to know the magnitude of this dose because so many other factors —costs, equipment size, and product quality—are determined by it.

In Stanford Research Institute's report, *The Industrial Utilization of Fission Products*, the requirements for killing organisms are estimated. In general, complete sterilization appears to require about 2,000,000 rep. Enzyme destruction probably requires five times that amount.

Effects on Food Quality

Destruction of microorganisms, however, is not the full story on the use of ionizing radiations for preserving foods. For at the same time that organisms are being destroyed, radiation unfortunately acts on other constituents of the product.

The most noticeable effects from radiation are changes in food flavor and color. Other changes may be detected by chemical analysis. Each food product, however, reacts characteristically, and no general statement can be made.

A few examples from the literature on this subject will give indications of some of the changes which may be encountered.

Proctor and Goldblith found that a temporary bleaching of a coffee infusion incurred upon irradiation, and that the typical coffee flavor and aroma were lost. The same workers also report a definite bleaching of the flesh of prunes, but not of the skin. This bleaching is temporary, although the final color differs from the original. No noticeable change was observed in the flavor of the prunes. Raisins, on the other hand, suffered a bleaching of both the skin and flesh, and a definite off-taste was noted.

Nickerson, Goldblith, and Proctor treated mackerel with 1,500,000 rep. of beta rays and reported no flavor changes. Similar results were reported with haddock.

Proctor and Goldblith in 1949 found that hamburger underwent flavor changes which were easily discernible in the raw but not in the cooked state.

These same workers learned that canned chopped meats—such as chopped beef, lamb, veal, and pork—underwent color changes.

It appears that such changes of flavor and appearance represent major obstacles yet to be overcome before there can be widespread use of the process for treatment of foods.

Chemical Aspects Revealing

Other, more subtle changes have been revealed through chemical analysis.

Proctor and Bhatia irradiated haddock fillets and used microbiological assay methods to study the effect of beta rays on certain amino acids. Losses up to 10 percent at 2,700,000 rep. were reported—an amount regarded by these workers as of no great significance. Similar small losses were found for beef patties and protein hydrolysates.

A tendency for the peroxide value of meat fat to rise has been reported by Proctor and Goldblith. Hannan in England and Meade in California recently reported similar findings.

Observers by Proctor and O'Meara on irradiated orange juice showed some loss of ascorbic acid. Huber also found a small loss of this vitamin in this product. However, studies by both Proctor and Huber indicate that other constituents present in orange juice may protect the ascorbic acid.

And very recent disclosures from these two research sources indicate that ascorbic acid and its derivatives, as well as other compounds of food origin, may be useful as protectors in the reduction of organoleptic changes due to radiation processing.

Since many foods contain relatively large amounts of water, it is also important to consider possible effects of radiation of this compound. Some investigators hold the opinion that the biological action of ionizing radiation is due mainly to products of irradiation of water. This presumes diffusion from the point of origin to nearby areas by the products of decomposition of water, some of which are very reactive. The subject, however, continues to be a matter of controversy, and there is still a strong case for the target theory.

It appears that both target and diffusion effects exist, and many of the so-called side-effects can be ascribed to the action of irradiation on the water or other constituents present. In this way can be found an explanation of the control of some of these changes through employment of certain measures.

As previously mentioned, the protection of ascorbic acid in presence of normal orange juice constituents can be ascribed to energy absorption by these constituents. Similarly, the beneficial action of freezing reported by Proctor, and by Brasch and Huber, can be explained by a limitation of diffusion of activated molecules or fragments (possibly free radicals) and subsequent reduction in opportunities for further reaction of these with other molecules.

Wholesomeness and Safety

While there is little positive information available on the wholesomeness of irradiated foods, it must be stressed that there is no basis for producing any radioactivity in the product through radiations of the type that have been discussed.

Proctor reports limited nutritional studies with irradiated foods. Using rats, he fed his animals for two years on a diet of food treated in this manner. The rats grew well and had a life span as long as those fed on a control diet.

Thus it would appear that irradiation should cause, at the most, only minor effects in the general wholesomeness of foods. However, experiments now in progress in several laboratories should clearly answer all aspects of this question in the near future.

Safety in handling equipment and radioactive isotopes does not present serious problems. The basic principle

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STERILIZATION COSTS Using Van de Graaff Electrostatic Generator

	Small Unit	High-Production Unit
Rate, lb. per hr.	120	2,400
Cost per hr.	$9.00	$36.00
Cost per lb.	$0.075	$0.015
Capital cost	$80,000	$400,000

TOTAL COSTS for Ham Sterilization by X-Rays From Fission Products

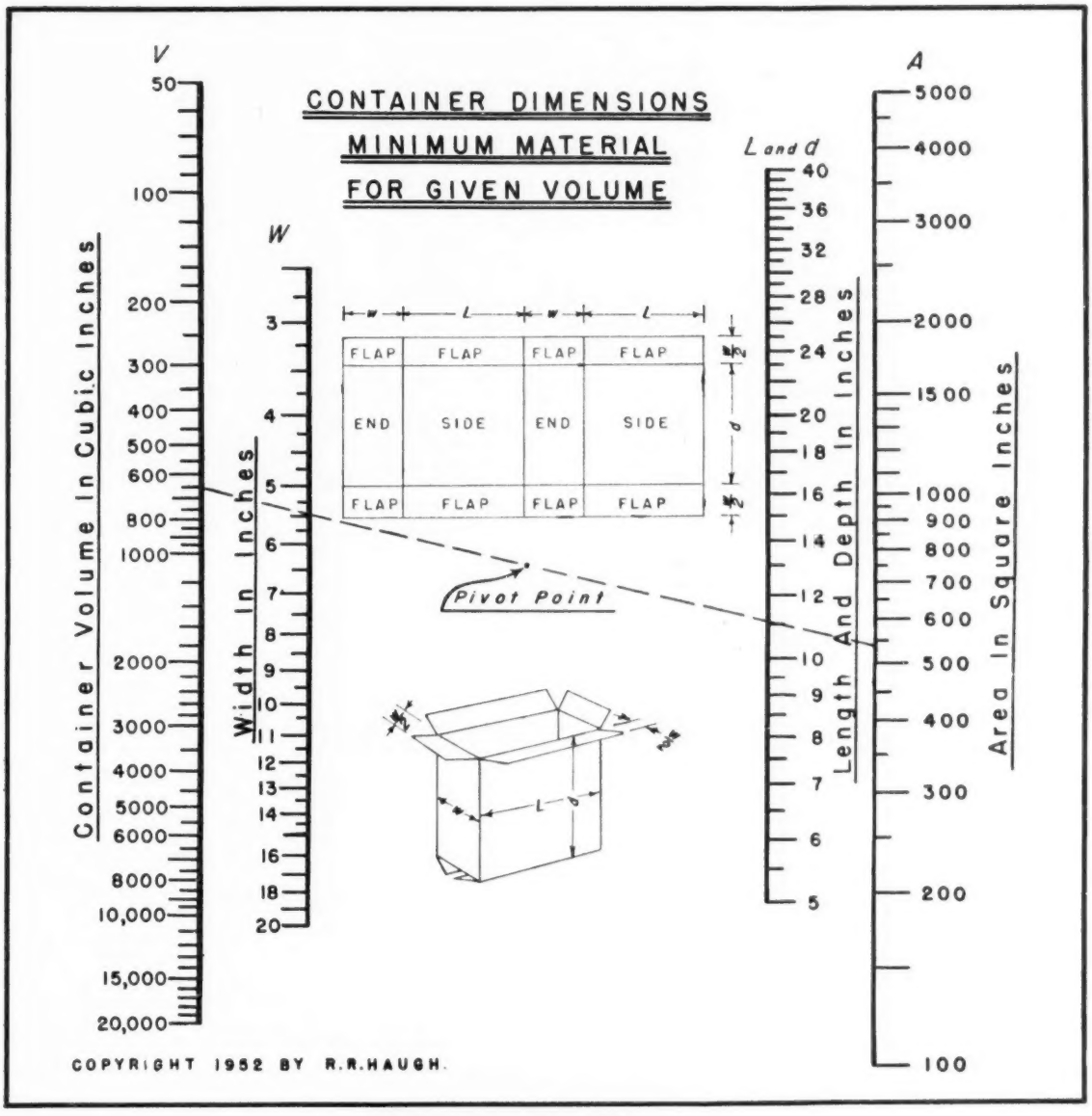
	$0.20 Per Curie	$2.00 Per Curie
Operating cost per lb.	2.4c.	3.0c.
Capital cost per lb.	0.7c.	4.7c.
Total costs per lb.	3.1c.	7.7c.
Capital investment	$155,000	$1,055,000

CAPITAL COSTS for Ham Sterilization by X-Rays From Fission Products

	$2.00 Per Curie	$0.20 Per Curie
Fission products	$1,000,000	$100,000
Sterilization unit	35,000	35,000
Supplementary equipment	20,000	20,000
Total capital costs	$1,055,000	$155,000

OPERATING COSTS for Ham Sterilization by X-Rays From Fission Products

	Costs per Day (300 days per year)	
Expense Items	**$2.00 Per Curie**	**$0.20 Per Curie**
Fission-product replenishment at rate of 10,000 curies per year	$67.00	$ 6.70
Labor (including taxes, etc.)		
Operator @ $4/hr.	96.00	96.00
Conveyor loading and unloading: 2 workers @ $2/hr.	48.00	48.00
Maintenance and repair	10.00	10.00
Utilities	5.00	5.00
Supervision and overhead	50.00	50.00
Taxes and insurance	10.00	10.00
Miscellaneous	14.00	14.30
Total daily operating cost	$300.00	$240.00



This Handy Chart—

Tells Right Carton Size in a Jiffy

R. R. HAUGH

Quartermaster Food & Container Institute for the Armed Forces, Chicago

When you plan to obtain cartons in volume, it is an economic prerequisite that the least amount of material be used both in area and thickness for the desired strength factors. Area of the material is a function of the design shape of the container.

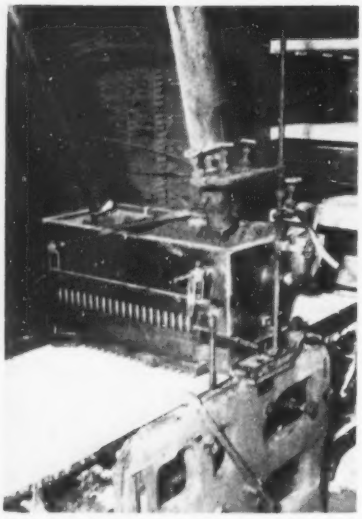
For rapid and simple determination of the dimensions of a container with minimum area for any given volume, the handy nomograph above may be used.

Minimum dimensions of a carton of a given volume are found as follows: Place a straight-edge so that it lines up the pivot point (in center of chart) with the given volume on the lefthand vertical scale. Then the width of the container is read on the second vertical scale; length and depth are shown on the third scale; and area on the fourth scale.

The dash line on our chart serves as an illustration. Here, 650 cu. in. was the container volume selected. So the 650 point on the lefthand scale was aligned with the pivot point and a line was scribed to touch the other three scales. As shown, this gives 5 7/16 in. as the width, 11⅛ in. as the length and depth, and 540 sq. in. as the area.

Of course, knowing any one of the four dimensions of this type of container all the other dimensions can be found by using that given dimension and the pivot point for locating the

(Turn to page 198)



CENTERS are checked at depositor to determine size deviations attributed to wearing of machine parts.

TECHNICIAN gages size and weight of centers coated with caramel, nuts, and chocolate.

BARS are sampled at caramel coating machine to check on undesired clustering of peanuts.

Their Sharp Uniformity Control

Trims Costly *Variation* Losses

Dollar-draining differences in amount and thickness of candy are curtailed by Brock company's practical statistical technique. . . . Machine efficiencies checked

E. DALTON WHITE
FE Correspondent, Atlanta, Ga.

By applying statistical control to problems of product uniformity, Brock Candy Co., of Chattanooga, Tenn., has notably cut processing bills —and just as notably advanced the quality of its products.

Elimination of variations in weight and thickness of chocolate coating alone has saved the firm at least $10,000 annually.

Statistical control is new to the candy industry. A variety of sampling tests have been used, with varying results, to maintain product uniformity. However, it appears that the statistical system provides a greater degree of accuracy than previous spot checking of candies traveling through production lines.

Accuracy in machine adjustment, flow of chocolate, and more even action of the vibrators, have contributed greatly in the manufacture of pieces of candy with minimum variations in weight of ingredients and thickness of chocolate coating.

This system maintains closer standards on weight and thickness of each component going into the production of candy bars. It also reduces the amount of scrap and number of rejects. Weight variations have been cut from 16 to 7 percent, and further reductions are being sought. Statistical control indicates the need for readjusting machines to keep products within standard weight and thickness limits.

Before the statistical-control system was used, several pieces of centers were weighed, run through an enrober, and re-weighed. The difference in the weights represented the amount of chocolate coating on the finished piece.

This method was inaccurate. Different sections of the machine applied varying amounts of chocolate. And it was necessary to check the entire width of the machine to obtain an average.

Brock's research department, under the direction of Fred Gilstrap, studied these test variations. Charts were employed to pin down the variations.

This information enabled the researchers to develop a standard testing procedure. It involves placing a sufficient number of individually weighed samples across the width of the belt traveling through the enrober. This test is carried out periodically during the work shift. And the data are charted to obtain an accurate count per pound to spot variation trends.

Statistical control is also employed at strategic points along the production line. This is necessary to prevent variations in one process from becoming exaggerated in subsequent ones.

Producing Uniform Bars

Chocolate-covered peanut bars, which have been under extensive study, consist of a cream-fudge center, 30 percent; caramel coating, 18 percent; peanuts, 30 percent; and chocolate coating, 22 percent. Obtaining the correct percentage of each component—evenly distributed—is the major production problem.

From a weight and shape standpoint, the fudge center is most important. The fudge is deposited into a series of molds by a battery of small pumps, working in unison.

It is here that product variation may begin. Contributing to variations are the amount of candy deposited by each pump, location of the fudge cast

USING micrometer to measure sugar crystals. Over-sizes indicate there are worn screens on grinder.

INSPECTION of chocolate-coating uniformity. Bars are weighed before and after leaving enrober.

into the molds, and the fluidity of the candy. Drastic differences in weight and variations in thickness result from improper casting.

One of the major problems was variations in the thickness at the ends and middle of chocolate-coated peanut and caramel-center candy bars. The degree of thickness varied from time to time and at different sections of the bar. Although slight, these variations detracted from the desired uniformity in weight and appearance.

Controlling Viscosity

With accurate data obtained by statistical control and analysis of the points of variance, it was found that an excessively viscous mixture resulted in bars with thicker ends. Further examination revealed that the mixture tended to solidify before it could flow evenly in the molds. Variations in the thickness of bars amounted to as much as $\frac{3}{8}$ in.

This problem was attacked from two angles. First, the viscosity of the mixture was reduced by increasing the temperature of the candy from 170 to 190 deg. F. And second, accurate nozzle flow was insured.

An examination revealed there were worn nozzles, which permitted depositing of excessive center material in the molds. It was also found that pump adjustments had to be made whenever weight variations reached 5/100 oz. Plungers are also likely to wear, resulting in variations as high as 1/10 oz. between the smallest and largest bars.

Analysis of the data indicated possible solutions—changes in machine and nozzle adjustments.

Further checks were then made and the data were compared with those from previous tests. Additional machine adjustments followed where indicated. And testing was continued until standard uniformity was achieved.

With such data it was possible to set up standards for adjusting machines and nozzles and to establish variation limits. Hence, corrections are now a matter of routine.

Such testing and statistical control make it possible to come closer to producing 16 oz. of a given number of candies to the pound than heretofore. Also, each piece is maintained within size and weight limits.

Making Machine Adjustments

It was discovered that a uniform application of caramel to the cream center is necessary for proper coating with peanuts. At this point, statistical data quickly revealed the need for frequent machine inspection by the operator to prevent caramel from dripping into the peanuts and then causing the nuts to cluster and attach to the bar.

The number of bars rejected because of such peanut clusters has been sharply reduced by close inspection at the caramel-coating machine. While these rejects are returned to batch mixers to be ground and re-melted for cream centers, they do constitute expensive materials whose misuse adds considerably to production costs.

Statistical control and machine adjustment, along with frequent inspection, has enabled the company to reduce its rejects and scrap from about 5 to slightly less than 2 percent.

Another problem solved was that concerned with variations in the amount of chocolate coating on candy bars. Examinations showed that these were primarily due to differences in vibration. Coverage was thinnest where vibrations were less intense.

New Vibrator Projected

This difficulty was overcome by bracing the unit's frame work to obtain greater uniformity in vibrations. Brock does not consider this change a cure-all. Its engineering department is now designing a spring-type, cam-operated unit which is expected to produce more uniformity in vibrations across the entire width of the production-line conveyor.

Previously, variations in chocolate coating amounted to as much as 7 percent. By modifying the vibrator these variations were reduced to 3 percent. And it is expected that these variations will be cut to about 1 percent.

A further improvement related to the coating process was made in the chocolate curtain. Company mechanics developed a new type of flow pan with adjustable outlets to produce a more even chocolate flow. The number of outlets was increased and each nozzle is adjustable.

Objective is to produce a uniform candy bar with top appearance appeal—a bar that will be exact in size and have an even chocolate coating. Brock considers it highly important from a production standpoint that materials control be maintained within very close limits so that all bars will closely approximate 1½ oz.

Variation limits are now set to within 2/5 oz. Machine adjustments are maintained so that the bars will average 1/55 oz., with limits set at 1.30 to 1.70 oz.

Checking Particle Size

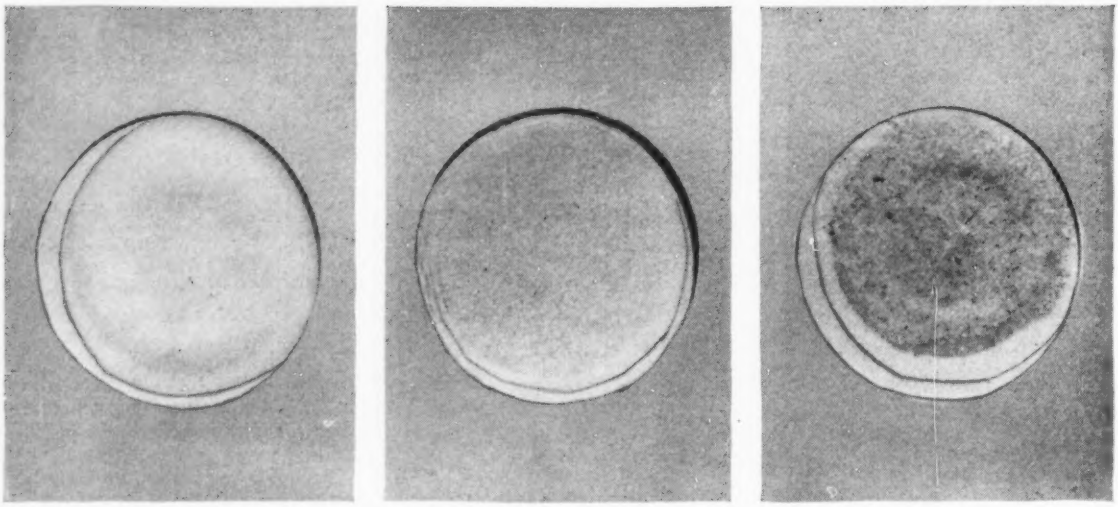
Sugar coming from the grinding machine is tested for particle size—a good criterion of the amount of screen wear. When statistical data show particles from the mill exceeding 0.0012 mesh, then the screens are replaced.

It is important that the sugar be completely ground to obtain a smooth chocolate coating. This is also true when using powdered sugar as a dusting agent on such items as marshmallows.

Statistical control has also enabled the firm to determine when the desired particle size (0.0005 in.) has been attained in a chocolate coating.

As stated, Brock uses its statistical control at the most important points

(*Turn to page 140*)



DISKS indicate sugar quality. Left: Very fine. Center: Meets ABCB standards. Right: Unacceptable for beverages.

Bottlers' Sugar Standards OK'd

Soft drink and sugar representatives agree on container specifications, limits of chemical and bacterial impurities, and uniform test-reporting system

H. E. KORAB

Technical Service Director,
American Bottlers of Carbonated Beverages,
Washington, D. C.

Tentative standards for bottlers' granulated sugar have just been approved by the executive board of the American Bottlers of Carbonated Beverages. They're effective July 1.

They give the bottler, for the first time, a yardstick (see accompanying box) with which to judge sugar quality, and assure him a product that will not be detrimental to his beverage.

Long Needed Move

For many years the ABCB and technical men in its field have been concerned with quality of sugar used in manufacture of their soft drinks. For excessive amounts of chemical impurities are detrimental to the flavor balance in the beverages.

They also cause foaming at the filler (resulting in short-fill bottles, spilled ingredients, and reduction in speed of operations), sediment, off-taste or masking of desirable flavor, off-odor, or yeast or bacterial spoilage.

Franchise houses that purchase sugar in large quantities to prepare finished syrups for their bottlers, have tested the product and purchased only that meeting their specifications.

The majority of franchise and private brand bottlers, however, buy sugar as needed from local sources. In such cases they have no control over the quality of the product.

In an attempt to obtain the best product available, some of these bottlers purchased sugar on specifications conforming to the bacteriological standards established by National Canners Assn. They assumed that if the sugar met the canners' standards it would be less likely to cause spoilage in soft drinks.

But it was found that this was an erroneous conclusion, because microorganisms that may cause spoilage in canned goods are not the same as the ones that are likely to spoil beverages.

Realizing the bottles' need for sugar that is low in impurities, a number of refiners made commendable efforts to provide it under various brand names. Understandably, properties of this product varied from supplier to supplier—partly because the soft drink bottlers had never determined their specific requirements.

In 1949, Nehi Corp., after many tests to determine how sugar that contains various amounts of non-sugar impurities effects taste, odor and appearance of its beverages, released to its franchise bottlers a list of brands of sugar that met its specifications. If quality of an unapproved brand got better, its name was added to the list. This system was found beneficial in improving quality of beverages produced by bottlers of this particular franchise.

Joint Committee Formed

In an attempt to aid its processors, ABCB's technical advisory committee consulted sugar representatives regarding suitable specifications. Since there was practically no uniformity in methods of expressing analytical results of tests on sugar products, this subject was discussed at a number of informal get-togethers. And subsequently, consideration was given to formation of a joint committee comprising soft drink bottlers and sugar representatives.

First step in this direction was a meeting in New York on June 21, 1951, called by Neil Kelly, executive director, Sugar Information, Inc. Present were seven representatives of the bottlers and eight from the sugar field.

Bottler representatives were: H. Butler, chemical director, Dr. Pepper Co.; H. E. Ridgeway, vice-president and B. C. Cole, technical director, The Seven-Up Co.; S. L. Galvin, research director, Pepsi-Cola Co.; C. Gortatowsky, director of quality control, The Coca-Cola Co.; J. F. Hale, manager, bottlers service dept., Nehi Corp.; and H. E. Korab, technical

service director, American Bottlers of Carbonated Beverages.

Those from the sugar field were: A. P. Anderson, technical director, Michigan Sugar Co.; W. A. Bemis, asst. chief chemist, Revere Sugar Refinery; A. L. Holven, plant manager, California & Hawaiian Sugar Refining Corp.; Miss Mary Hughes, research director, Refined Syrups & Sugars, Inc.; E. H. Hungerford, general chemist, Great Western Sugar Co.; Neil Kelly, executive director, Sugar Information, Inc.; E. W. Meeker, American Sugar Refining Co.; W. G. Raines, Hershey Corp.; and Frank Rawlings, research director, The Amalgamated Sugar Co.

As a result of this meeting a four-member (later increased to six) subcommittee was formed to study means of developing common units for expression of color, turbidity, and ash of white sugars. This committee was also expected to consider other analytical tests of importance and arrange for their study.

Committee members were: Messrs Holven (chairman), Rawlings, Korab, Cole, Gortatowsky, and Miss Hughes.

The committee felt that the problems of color, turbidity, and ash might best be referred to the U. S. Committee of the International Commission for Uniform Methods of Sugar Analysis, inasmuch as that body had already done work on test methods for sugar analysis. Referees involved in this work agreed to the assignment, and plans were subsequently developed for making a survey of various tests.

Since each organization had its own methods of analyzing for color, turbidity, and ash, it was not an object of the survey to develop new ways for these determinations. On the contrary, work was to be conducted with one goal in mind—development of a uniform means for expressing results of the tests that would permit the various companies to indicate their measurements in terms readily understandable by all concerned.

Following preliminary arrangements, a survey was made by bottling and sugar representatives, and outside laboratories. It involved testing samples, and collating details on pertinent test methods used by each organization.

Samples (50 lb.) were received from 17 companies. Each was thoroughly mixed and carefully divided into 24 portions (2-lb.) for distribution to the participating laboratories. Preparation of the samples, compilation of results obtained by each organization, making charts and graphs, and consultation with the U.S. National Committee was handled entirely by Messrs. Holven, and Rawlings, and T. R. Gillett, C & H Sugar Refining Corp.

Additional sub- and general-committee meetings were held to discuss results of analyses by various laboratories. At the last general meeting, (Feb. 1952), bottler representatives presented a Proposed Tentative Standard for Bottlers' Sugar. But sugar representatives opposed the proposal. Their objections were recorded and studied, then the sub-committee met and drafted new proposed tentative standards.* These were submitted to both bottlers and sugar representatives for study.

Comment indicated that more than 90 percent would accept the new standards. So they were submitted to the executive board of ABCB for approval, which was granted. As stated, the Tentative Standards will become effective July 1.

They apply to dry granulated sugar as produced, immediately prior to packing, and are not applicable to liquid sugars.

* Universally accepted methods of testing for turbidity and floc-producing substances have not yet been developed, so these are not covered in the standards. As soon as accepted test methods and tolerances have been established they will be added.

Tentative Standards for Bottlers' Sugar

(Effective July 1, Dry Granulated Sugar Only)

1. Containers. For protection of product, bottlers' sugar shall not be packed in cotton or fabric bags but shall be packed in multi-wall paper bags or equivalent sanitary packages or bulk containers.

2. Container Identification. Each container shall be marked or coded to make it possible for the sugar purchaser to identify the place of production and date of packing.

3. Designation of Type. Each container shall be marked "Bottlers'."

4. Ash. The ash content of bottlers' sugar shall not be more than 0.015 percent.[1, 2]

5. Color. The solution color of bottlers' sugar shall not be more than 35 reference basis units.[1]

6. Sediment. The sediment content of bottlers' sugar shall not be more than shown on prepared sediment disks[3] (see photos).

7. Taste and Odor. Bottlers' sugar shall have no obviously objectionable taste or odor in either dry form or in a 10 percent sugar solution prepared with tasteless, odorless water.[4]

8. Bacteriological.[5] Bottlers' sugar shall not contain more than:

200 mesophilic bacteria per 10g.
10 yeast per 10g.
10 mold per 10g.

9. Sampling. Bottlers' sugar shall be adequately sampled by the producer immediately prior to packing to assure compliance with these standards.

References

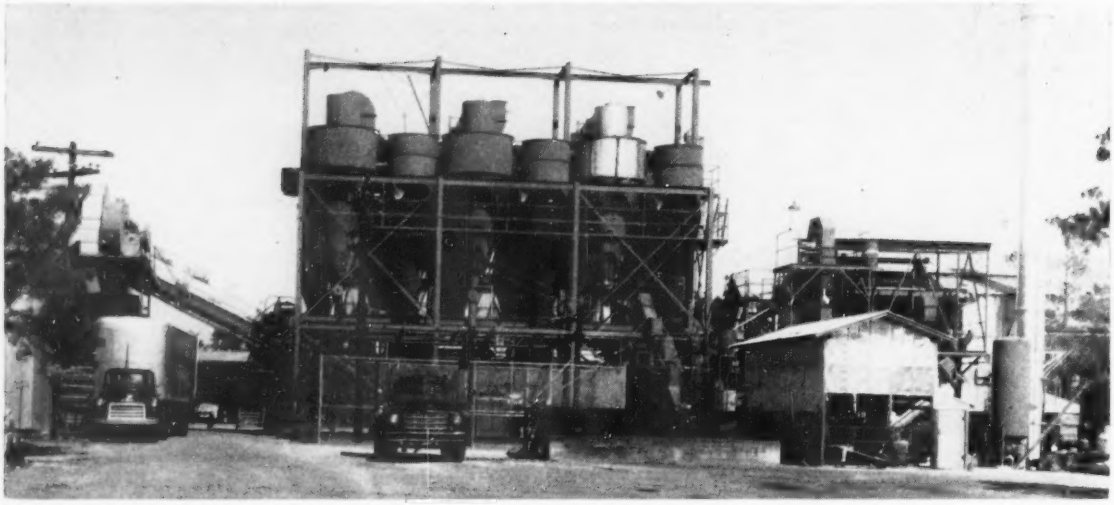
[1] Reference basis units have been developed, and a procedure will be worked out, whereby any laboratory may be able to convert results of tests to these units. Interested persons are requested to write either A. L. Holven, plant manager, California & Hawaiian Sugar Refining Corp., Crockett, Calif., or H. E. Korab, American Bottlers of Carbonated Beverages, 1128 Sixteenth St., N.W., Washington 6, D. C.

[2] Conductometric determinations are generally used for ash. However, in order that results may be interchangeable, reference temperature, water, correction, and conversion factor from conductivity to percent ash must be the same as established by joint research committee.

[3] Sugar (300g.), dissolved in previously filtered distilled water, is filtered through Whatman paper No. 40, 41, 54 or equivalent, with 1⅛ in. dia. circle exposed. Prepared sediment disks are available on request from ABCB, Washington 6, D. C.

[4] Odorless jar, ⅔ full of granulated sugar, is sealed tightly, and allowed to stand 30 min. at 30 deg. C. before opening. Then sugar is smelled and tasted for objectionable defects. Another jar, ⅔ full with 10 percent sugar solution made with odorless, tasteless water, is sealed and held 30 min. at 30 deg. C. before testing similarly.

[5] The procedure specifically recommended for beverage laboratories (*"Bacteriological Test Methods"*) is available upon request from ABCB.



OVERALL VIEW. Incoming peel enters bin (center foreground) moves to shredders and presses (right), then to 3-stage dryer (center). Then, via incline (left background), it goes to warehouse for bagging and storage.

Integrate Complex Operation

And Make a Better Feed From Peel

Flash dryers, special handling units, control and safety instruments —all are skillfully combined by citrus canner's engineers to convert solids into top-quality byproduct. Press water is also utilized

WALTER H. HARTE
Former Process Engineer, Minute Maid Corp., Plymouth, Fla. now with Air Reduction Co., New York City

"Why change our method of making citrus feed when we already produce the best in the state—with the most efficient operation?"

This was the question asked by the production department at Minute Maid Corp. when the company's engineering department went about installing flash dryers in the new feed mill at Plymouth, Fla.

But today, after a full year's operation, this first flash-drying mill* can boast of these advantages:

- **A superior, more saleable feed having improved physical properties.**
- **Exceptional ease of operation through use of the most up-to-date automatic control equipment.**
- **Relatively low first cost and operating economy.**

* Fundamentals of flash drying and commercial equipment available were considered in the article, "Top-Quality Drying in a Flash," FE Apr. '52 p. 57.

Made out of peel, rag, and seeds discharged from the firm's juicing plant, the dryed citrus feed is used extensively in the feeding of dairy cattle. The light, almost natural colored product, free of any black specks (burnt particles caused by long heat exposure or contact with the hot metal of the dryer) characterizes the feed produced in these new short-residence-time flash units. Another physical advantage is that the bulk density is lower—giving a larger bag to the dairy farmer.

Layout and Process Points

Starting with a barren, sandy field (about ¼ mile from the main plant) and a limited budget, the company's design group came up with one of the most novel, yet efficient, of operations.

Practically all the major equipment stands outdoors, thus minimizing costly building investment. Besides the product warehouse, the only sheltered areas are the control room (between the two dryer banks), a firing aisle for the dryer furnaces and small steam boiler, and a shack to protect the metal detector.

This first commercial application of flash drying to the manufacture of citrus-pulp cattle feed includes the following features:

(1) A peel bin of a self-emptying design built into the ground without any coverage whatsoever.

(2) An electronic metal detector controlling an automatic trap door to drop out foreign matter from peel.

(3) A unique feed arrangement to insure a steady flow of conditioned peel to the dryers.

(4) Two completely integrated sets of controls—one on all the electrical equipment, the other on the two banks of three-stage dryers.

(5) A novel conveyor cooler combination between dryers and baggers.

(6) A four-way classification system to separate the different grades of feed prior to bagging.

Essentially, peel preparation before drying consists of shredding, conditioning, and pressing. Orange and grapefruit rind enter this system via the sub-ground bin.

A variable speed, heavy duty, screw conveyor elevates the waste material from the bin to a chute leading through the field of an RCA electronic metal detector. The rate of feed from the bin is regulated to match the tonnage coming in from the juicing plant.

Any foreign metallic material in the wet peel immediately activates a circuit in the detector, which then energizes a relay, snapping open a trap door at the base of the chute via a solenoid trip. Just the exact amount of delay is effected in the circuit to insure the foreign matter being at the bottom of the chute when the trap door opens. Removing any stray metal protects the high-speed shredders and screw conveyors from damage.

Here, a chemical agent is added to help condition the peel for pressing.

Two comminutors shred the peel into particles ranging in size from $\frac{1}{4}$ and $\frac{3}{8}$ in. Each shredder operates at 3,600 rpm. and is directly connected to a 50 hp. motor. Shredded material drops into a delay screw, where it's mixed for several minutes with some press water, recycled to help condition the peel.

Then two hydraulic presses squeeze out about half the peel moisture as press water. These presses are steam heated. They operate continuously.

Press cake—at about 67 percent moisture content—is immediately sent to the dryers, while the press water—with 7-8 percent dissolved sugars—is divided into two streams.

The first is recycled back to the delay screw for the previously mentioned conditioning aid, while the second part is screened, pumped to storage, and eventually made into citrus molasses. The wet screenings from this second part are also dumped back into the delay screw.

Dryers in Banks

Two independent banks of air-suspension flash dryers have been installed to handle Minute Maid's drying load at Plymouth. These units were engineered to produce a dry product (8 percent moisture) from wet peel entering the mill at the rate of 25 tons per hour.

The feed to each dryer bank is regulated by a small section of screw conveyor driven with a variable speed motor. These feeders are started at low speed and gradually accelerated to handle the incoming peel. Any press cake that cannot immediately be handled in these dryer feeders is returned to the main elevator.

Just before entering the first dryer tower, press cake passes through a picker or fluffer. This is a short section of conveyor, with two parallel, counter-rotating, cut-flight screws. The high speed action tends to toss the press cake around so that it's well broken up for uniform drying.

A REVEALING LOOK AT THIS LINE is offered in this month's special FE Foldout Flowsheet, titled "Advanced Citrus-Peel Process." And sharp photos of units are included, as well as a handy table of equipment. Just turn to pages 118-121.

An average peel particle passes through all three stages of the dryer in about 10-15 min. Each stage is made up of a drying tower, cyclone separator, and blower. All three of the towers, in each bank, are supplied with hot exhaust gases from a 9-ft. dia. tubular furnace using Bunker C oil. An air-atomizing type burner is employed.

A Swirling Path

Fluffed press cake is drawn into the first tower venturi by the hot gases rising into the dryer from the main duct—which is 4 ft. high x 8 ft. wide. Gas velocities at this point are very high due to the relatively small cross-sectional area of the venturi. Straightening vanes insure a streamlined flow of entrained peel into the cone immediately above.

The major part of the drying in any tower occurs in this cone section. As the gas velocities gradually decrease—because of the increasing cross-sectional area—the wet peel particles tend to slip and bounce in the moving stream. Then the warm gases gradually dry out these particles, causing them to lose weight, whereupon they are swept into the upper part of the tower.

Here, a spiral, swirling action is imparted to the partially dryed peel and partially spent gas by several sets of tangentially placed baffles or louvers. These are adjusted to retain the entrained particles just long enough so that the gas can efficiently transfer its remaining effective heat for drying before being expelled.

Peel is separated from the spent gases in a 9-ft. dia. cyclone. Solids are ejected through a rotating air lock at the bottom of the separator, while the gases are moved to atmosphere with a blower mounted above the cyclone. The blower unit was purposely placed in this position so that the semi-fragile peel would never have to pass through the blower blades and be subjected to unnecessary breakage.

The peel, in turn, drops into a conveyor feeding the second stage dryer, where the above action is repeated. And finally it goes to a third and final stage. Since the blowers are placed at the cyclone air discharge ports, the ducts, towers, and cyclones are all under slight vacuum.

Rapid Cooling

Upon leaving the third dryer stage, the feed may be (1) recycled to the first stage, (2) discharged to the cooling conveyor, or (3) partially recycled. Specific alternative depends on the dryer load and product moisture. Feed at this point is too hot (130 deg. F.) to be bagged. And so it must be cooled to below 100 deg. F.

A unique conveyor-cooler combination—dubbed by Minute Maid the "coolveyor"—was developed to remove heat from the product as well as screw-convey it to the bagging station. The screw was fitted into a trough with extra high walls, allowing for a 6-in. air space between trough cover and top of the flights. In operation, a blower forces atmospheric air concurrent to the flow of warm peel. This air is directed into the trough at a number of points.

The agitation afforded by the moving flights is sufficient to produce the necessary contact between warm feed and coolant air. Spent, warmer air is then moved to a small cyclone, where entrained fines are separated and bagged.

Cooled feed below 100 deg. F., is now screened on a multiple-decked shaker unit. The large pieces, not going through the top screen, slide down a chute and are bagged. This product is normally reprocessed.

That portion retained on the second screen—by far the largest fraction—is fed into an automatic bagging machine, which weighs out 100-lb. batches and fills these into jute bags. Citrus feed meal, made up of the smaller particles that fall through both the top and second screens is then bagged.

The bagging station for the oversized particles, feed, and meal is in one corner of the warehouse. Here, product is stacked on wooden pallets. To reduce the dust nuisance in this corner, a large hood was placed over all the bagging equipment. The coolveyor blower takes its air (suction) from here, along with any dust that might tend to accumulate. The dust eventually ends up in the coolveyor cyclone as fines.

Operation Figures

During peak periods the mill handles 25 tons of wet peel (82 percent moisture) per hour. Average ratio of weight of wet peel to finished product is 6.1. Thus, the bagged feed rate during peak hours exceeds 4 tons. At

100 lb. per bag, this amounts to over 80 bags/hr. of pulp meal, and fines.

This drying rate is accomplished by burning, in the tubular furnaces, between 60 and 65 gal. of Bunker C fuel oil per ton of product. Almost exactly 1 ton of press water is shipped from the plant for every 2 tons of feed entered.

Dryer and furnace instruments consist of a control system and an electrical safety system. The former regulates tower temperatures and cyclone pressures, while the latter safely shuts down the operation in event of mechanical failure or fire.

Each dryer stage is equipped with a two-pen recorder-controller. One pen on the first stage records the outlet temperature and its action then serves to regulate the flow of oil to the furnace—a drop in temperature calling for more fuel. The second pen records negative pressure in the cyclone, and its action opens or closes a damper in the duct between tower and cyclone. This compensates for varying dryer loads.

The second and third stage controllers operate similarly, but here the temperature pen serves to regulate air-dilution dampers at the base of the towers instead of oil flow. Temperature, of course, is gradually reduced in the successive stages to prevent "charring" or "toasting" of the product.

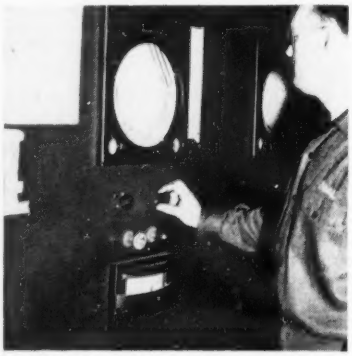
The system is set up so that failure of equipment or excessive temperatures at any one of the nine dryer stations will immediately cause cut-

(Turn to page 154)

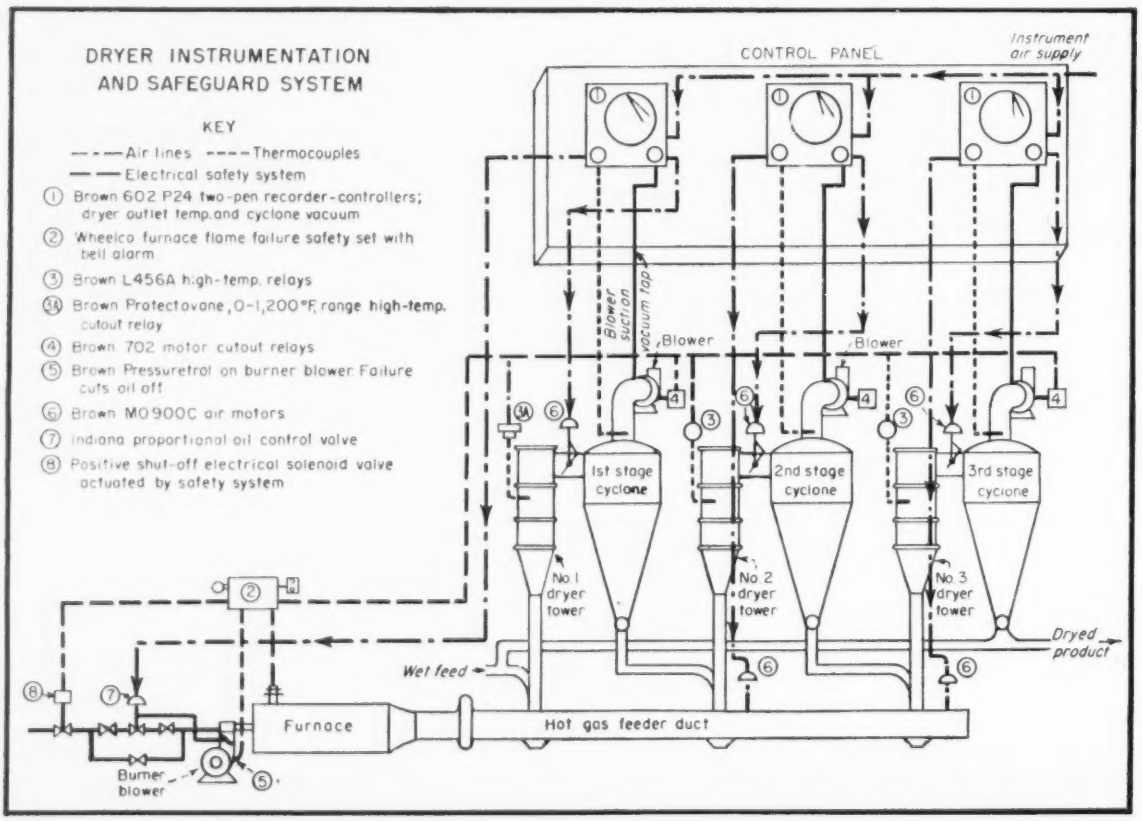
Data on Dryer, Instruments, and Safeguards

DESIGN AND OPERATING Data on Three-Stage Dryer

	Dryer Stage		
	1	2	3
Design Factors			
Tower venturi dia. (ft.-in.)	2-6	2-6	2-6
Tower top dia. (ft.-in.)	6-3	6-3	6-3
Blower hp.	75	50	50
Operating Conditions			
Duct temperature, deg. F.	1,200	955	905
Venturi temperature, deg. F.	1,100	560	500
Discharge temperature, deg. F.	260	300	260
Blower suction, (vacuum, in. water)	12	8.5	8.0
Blower discharge, cfm. (approx.)	18,000	15,000	16,000
Blower rpm.	1,150	1,000	1,050
Moisture in peel (8% product)	67%	46%	40%



PANEL from which operator runs mill. Control room is between the two banks of flash dryers.


DRYER INSTRUMENTATION AND SAFEGUARD SYSTEM
KEY
Air lines
Thermocouples
Electrical safety system
① Brown 602 P24 two-pen recorder-controllers; dryer outlet temp.and cyclone vacuum
② Wheelco furnace flame failure safety set with bell alarm
③ Brown L456A high-temp. relays
③A Brown Protectovane, 0-1,200°F. range high-temp. cutout relay
④ Brown 702 motor cutout relays
⑤ Brown Pressuretrol on burner blower. Failure cuts oil off
⑥ Brown M0900C air motors
⑦ Indiana proportional oil control valve
⑧ Positive shut-off electrical solenoid valve actuated by safety system
CONTROL PANEL
Instrument air supply
Blower suction vacuum tap
Blower
Blower
1st stage cyclone
2nd stage cyclone
3rd stage cyclone
No. 1 dryer tower
No. 2 dryer tower
No. 3 dryer tower
Dryed product
Wet feed
Furnace
Hot gas feeder duct
Burner blower

Detergents Effective In Removing Mold From Fruit

RICHARD D. HAYNES, HARRIET HARLIN, J. ORVIN MUNDT and ROY STOKES

Respectively, Monsanto Chemical Co., St. Louis, Mo.; Pillsbury Mills, Inc., Minneapolis; and (last two named) University of Tennessee, Knoxville

Addition of detergents to wash water offers an effective, inexpensive means of removing molds from fruit.

Tests carried out with strawberries, for example, have revealed mold-count reductions exceeding 50 percent.

Employed as detergents were small amounts of Santomerse D (alkyl aryl sodium sulfonate), which imparts bactericidal properties, and Sterox CD (nonionic polyoxyethelene ester). Both are relatively nontoxic.

Cost of the detergents is low—about 0.05c. per lb. of berries, on the basis of using 10 gal. of an 0.1 percent solution of Sterox or Santomerse. Considering losses from condemned berries and price differentials between different grades, it is apparent that this use of detergents can be beneficial dollar-wise.

Relative efficiencies of various washers and washing techniques in removing molds with both detergents are shown in the accompanying table.

Best result—a 54 percent reduction—was obtained by washing berries with Santomerse in a soaker washer and then rinsing them in a shaker-spray washer.

Spraying berries on a stationary screen failed to give consistent reductions with or without a detergent.

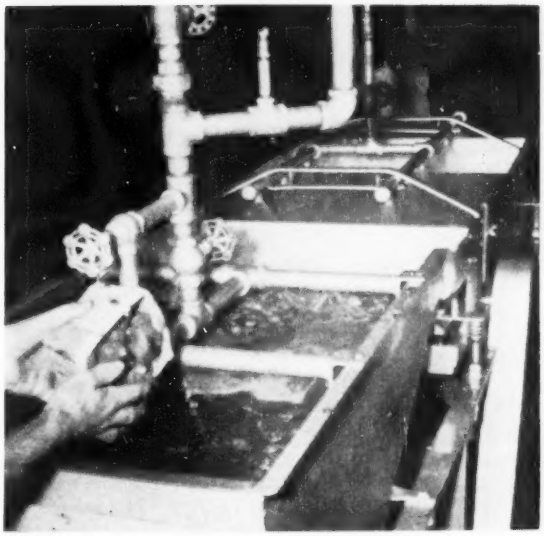
Good performance—a 51 percent reduction—was reported with the forced-immersion washer and Santomerse. This unit, developed in the Monsanto laboratories, employs a new technique. Berries are forced up and down in a detergent solution as they travel through the washer.

Advantages of the new unit over soaker washers are twofold: (1) Forcing the berries through the detergent solution assures better cleaning, and (2) conveying the fruit through washer eliminates need for a pushing action.

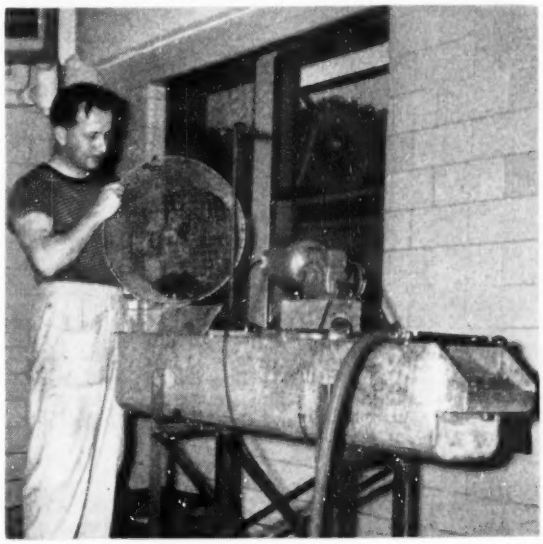
(*Turn to page 150*)

HOW VARIOUS Washers and Treatments Reduced Mold Counts on Strawberries

Type of Washer	Treatment	Reduction in Mold Count (Percent)
Soaker and shaker spray in series..	Santomerse soaked and water sprayed	54
Soaker and shaker spray in series..	Water soaked and water sprayed	20
Soaker and shaker spray in series..	Sterox soaked and water sprayed	28
Shaker-spray.....	Sterox sprayed	48
Shaker-spray.....	Water sprayed	36
Soaker.....	Sterox soaked	25
Soaker.....	Water soaked	15
Forced immersion.....	Sterox	39
Forced immersion.....	Santomerse	27
Forced immersion.....	Water	0
Forced immersion (pilot model)...	Santomerse	51
Forced immersion (pilot model)...	Water	8



USING this conventional soaker-washer and shaker-sprayer and Santomerse treatment, a 54-percent reduction in mold count was obtained on washed strawberries.



THIS new forced-immersion washer was designed by Monsanto Chemical Co. Using pilot model with Santomerse, a 51 percent reduction in mold count was reported.

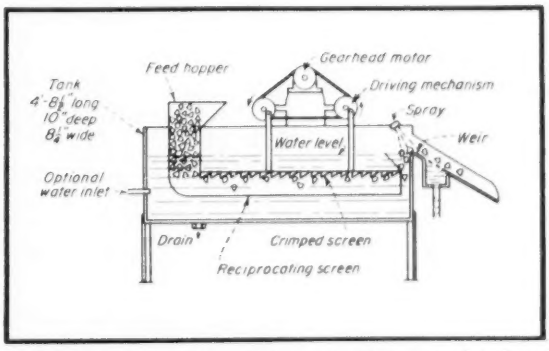
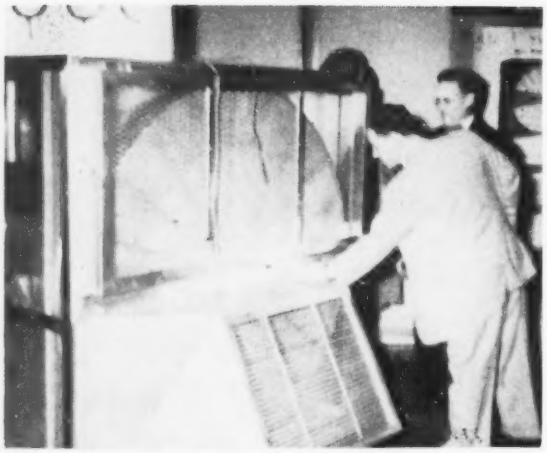


DIAGRAM of forced-immersion unit illustrates details of this advanced technique. Berries going through washer are forced up and down in the detergent solution.



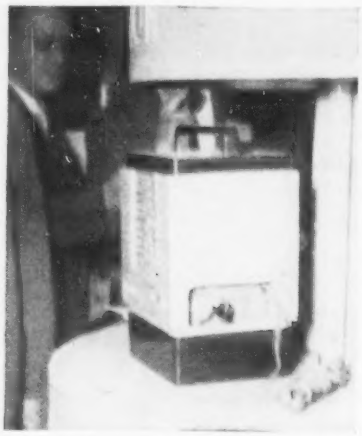
HEAT IS SALVAGED with device of Therm-O-Wheel, Inc., New York. Metal wool in wheel extracts heat from exhaust air, transfers it to fresh air. (88A)

WHAT'S NEW IN AIR CONDITIONERS

Dozen innovations in equipment for food plants. Caught by FE camera at recent Chicago exposition sponsored by American Society of Heating & Ventilating Engineers

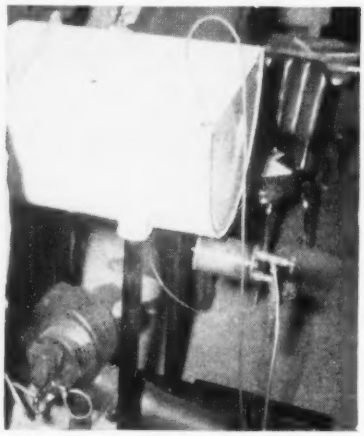
COMPACT DEHUMIDIFIER of Dryomatic Corp., Alexandria, Va., can cut atmospheric moisture content by 80 percent and hold steady 10-percent rh. Capacity: Up to 35,000 cu. ft. (88B)

"FILE-DRAWER" construction permits build-up of electrostatic dust precipitator to suit capacity of expanding plant area. Displayed by Air-Maze Corp., Cleveland, system removes 90 percent or more of dirt. (88C)



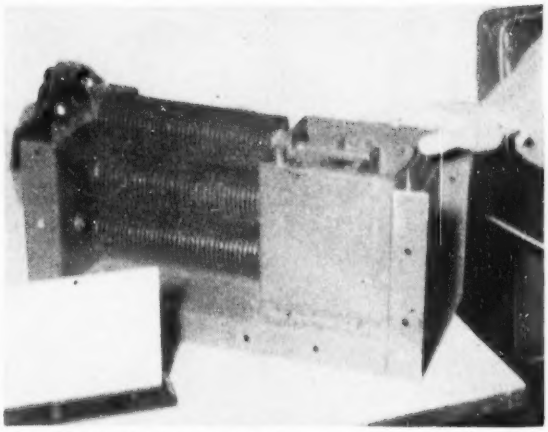
ANTISEPTICIZER will reduce airborne bacteria and virus with vaporized triethylene glycol, nontoxic to humans and animals. Portable unit is made by Iron City Chemical Co., Valencia, Pa. (88D)

ABSORBING solution in new Niagara Blower Co. (Buffalo) air-drying system permits efficient dehumidification with less need for refrigeration cooling. Prevents low-temperature frost formation. (88E)

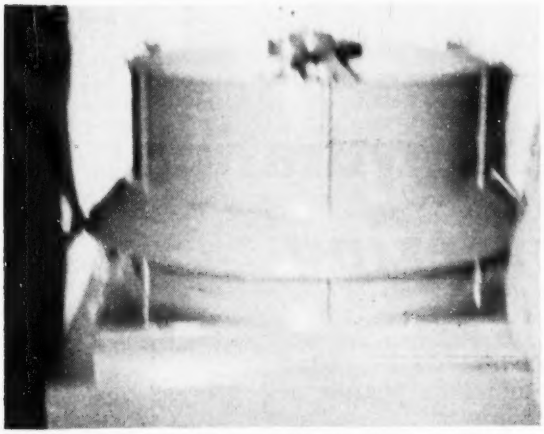


DE-SLUDGER for draining water and foreign material from bottom of a tank was featured by Eds-Wil Engineering, Chicago. Sump pump below tank collects and stores sludge, if desired. (88F)

PURIFYING unit removes dirt from steam, condenses aromatics in evaporation, recovers solids from vapors; displayed by V. D. Anderson Co., Cleveland. Has been used on food concentrators. (89A)



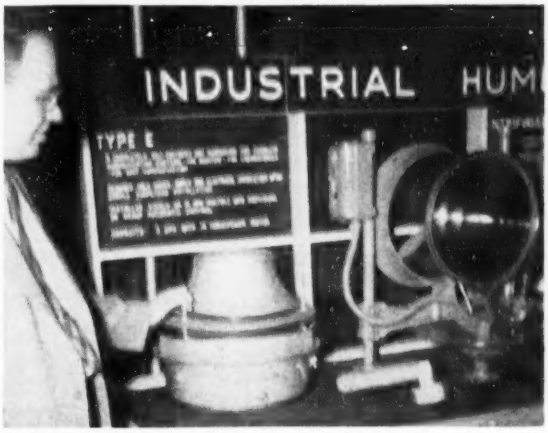
HEAVY-DUTY steam coils built entirely of steel by Westinghouse Electric Corp., Boston, to withstand cleaners used in various food process applications, as for example in meat smoking. (89B)



DIRECT-CONNECTED roof exhauster shown for first time by Gallaher Co., Omaha. Belt-driven unit handles up to 65,000 cfm., employs backwardly curved fan for high static pressures. (89C)

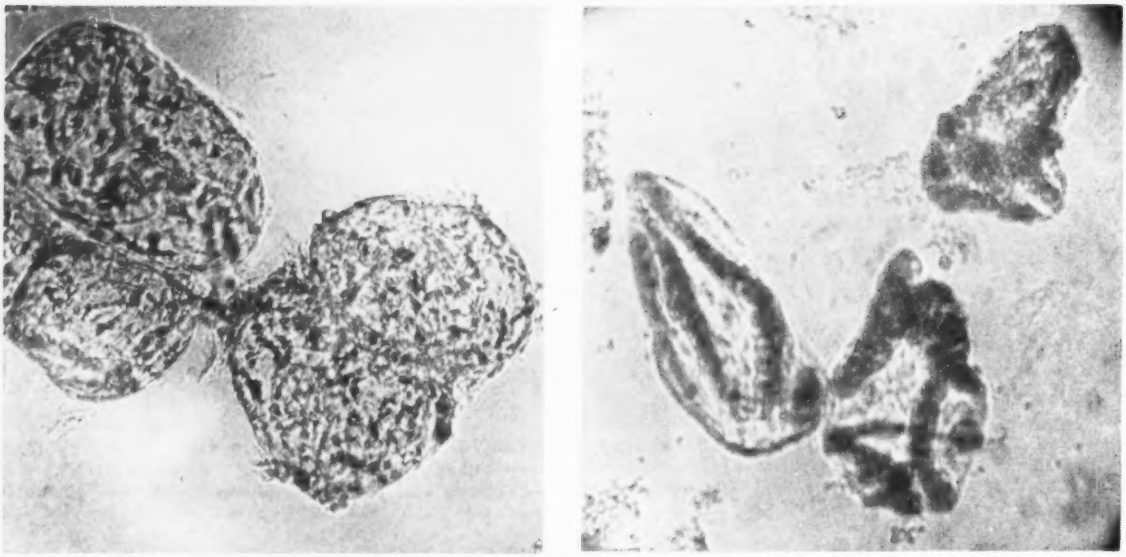
CONDENSATE-RETURN unit is very compact, yet can handle 500 to 8,000 sq. ft. Displayed by American Hydrovac, Brooklyn, it employs centrifugal pump, heavy-duty 1/4-hp. enclosed motor. (89D)

SEALED, self-contained refrigeration compressor displayed for first time by Trane Co., La Crosse, Wis. Compact unit fits inside air conditioning "package," employs direct-drive. (89E)



SELF-CONTAINED humidifier of high capacity shown by Bahnson Co., Winston-Salem, N. C. Unit has built-in humidity control, can evaporate up to 3 gph. of water. Employs fractional-hp. motor. (89F)

Want more information about any items in this picture article? Just circle key number (in parenthesis at end of each caption) on the Reader Service coupon, page 157.



HOW FREEZING CHANGES POTATO CELLS. Left photo: Original cells before freezing. Right photo: Cells after they have been frozen and thawed. Note wrinkled, shunken appearance of latter.

Better Potato Dehydrating *By Slow Freezing*

Study demonstrates that extension of the cooling period will liberate up to 10 percent more moisture than quick process

RAYMOND C. HALL

Chemical Engineering Department, Kansas State College, Manhattan, Kan.

Rate of freezing following cooking is an important factor affecting the amount of water removed from Irish potatoes as an initial step in the dehydration process.

Quick freezing results in minimum extraction on pressing. Very slow freezing, on the other hand, releases almost 10 percent more moisture from the potato cells.

These findings resulted from an investigation of the influence of freezing rate of cooked potatoes on the quantity of water that could be removed by subsequent thawing and pressing.

Various processes for dehydration of Irish potatoes call for freezing with subsequent thawing and pressing as a method for initially removing part of water.[1-6] In brief, it has been found that, if cooked potatoes are frozen and thawed, it is possible to reduce the water content from about 80 to 60 percent by pressing.

When considering these processes, however, influence of various factors that contribute to quantity of water removed needs to be known. Among these are such items as variety of potato, degree of maturity, cooking conditions, rate of thaw, and intensity of pressure or squeeze on the thawed material.

Cooked potatoes were frozen at

MOISTURE CONTENT of Pressed Granules Is Specifically Related to Rate of Freezing Cooked Product. (Mc: McClure; LS: LaSalle; R: Russets)

Batch No.	Variety	Moisture After Press (Percent)	Assumed Effective Freezing Range, Deg. F. 31–27 Time (Min.)	31–29 Time (Min.)	34–29 Time (Min.)	32–29 Time (Min.)
1	Mc	67	12	7	20	10
	LS	66				
	R	68				
	Ave.	67				
2	Mc	59	42	23	62	41
	LS	69				
	R	63				
	Ave.	64				
3	Mc	63	90	83	105	90
	LS	62				
	R	59				
	Ave.	61				
4	Mc	57	360	285	302	290
	LS	60				
	R	56				
	Ave.	58				

four different rates, then thawed and pressed under uniform conditions and moisture content of the press cake was determined. Resulting moisture contents were plotted as a function of rate of freeze (over an assumed effective temperature range) and the curve expressed as an equation.

Three varieties of well matured potatoes were used: Russets from Idaho, McClures from Colorado, and La-Salles from Kaw Valley of Kansas. They were purchased through commercial grocery suppliers. The smallest weighed 123g. and larger ones were halved so that the largest pieces weighed no more than 220g.

All cooks were made at 5 lb. gage pressure for 25 min. with potatoes on a perforated shelf above boiling water, in an atmosphere of steam.

Following removal of tubers from cooker, they were cooled to about 65 deg. F. by flooding with tap water for 45 min.

Tubers from the three varieties were then mixed and frozen at a controlled rate. Rapid freezing (Batch No. 1, Fig. 1) was accomplished by plunging cooled potatoes into $CaCl_2$ brine at −30 deg. F. Medium rates of freezing (Batches 2 and 3) were obtained by placing tubers on a screen tray above the cold $CaCl_2$ brine and enclosing the system with insulated walls. Slow freezing (Batch 4) was by placing potatoes on trays (as for the medium freeze) but with the brine and enclosure at a warm temperature. Temperature was then slowly lowered.

A uniform rate of thaw was established by placing the potatoes on a tray under the blast of an electric fan. In all cases, 1 hr. at room temperature was allowed for thawing. Uniform pressing conditions were established by applying 500 psi. pressure to a 1-in. thick cake.

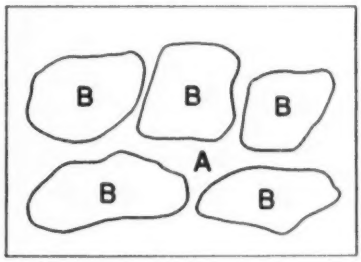
After pressing, potatoes were granulated by brushing through a sieve, and moisture contents were determined gravimetrically by drying 6 hr. in a vacuum oven at 72 deg. C.

Our lead photos show potato cells before (left) and after (right) freezing and thawing. And they clearly indicate that the cell walls have undergone a change. Terms used to

(Turn to page 150)

Inside Story of Freezing Action

A potato comprises plant cells—(B) in accompanying sketch representing a tiny portion of tuber—and voids (A) that form continuous capillary tube-like passageways to the surface. Both areas contain solutions of plant substances in water, but the solution in (B) is more concentrated than in (A).



Walls of the cells are such that they will not allow the plant substances to pass through, but will permit water to flow at a very slow rate. Thus, they may be considered as semi-permeable membranes. If two solutions of different concentrations are separated by such a membrane (as the wall of the potato cell) and the less concentrated is frozen, water will tend to flow from the more concentrated liquid to the frozen solution.

Keeping these points in mind, let us now consider a cooked potato that is being slowly cooled, with reference to our sketch—

1. Since (A) is a solution, it will not freeze until the temperature is below 32 deg. F.

2. Since (B) is a stronger solution than (A) it will not freeze as quickly.

3. As the temperature is lowered there will be a period when (A) is frozen and (B) is not.

4. During this period, water will move from (B) to (A).

5. The length of time during which (A) is frozen and (B) is liquid will influence the quantity of water that flows from (B) to (A).

6. As soon as (B) is frozen the aforesaid flow of water will stop.

7. If the temperature is slowly raised, solution in (B) will thaw first and water will again flow—as in (4) and (5) above.

8. As temperature continues to rise, solution in (A) will thaw.

9. When this happens, water may start to flow from (A) to (B) at a rate dictated by the nature of the cell wall.

10. Since there is an excess of water in (A), it is possible to force this out through the voids by reducing their volume. This may be done by applying pressure, or by centrifuging.

It is thus apparent that the critical factor governing quantity of water that may be removed from a given potato is the length of time (A) is frozen and (B) is liquid. These conditions may be set up during the periods when temperature rises or falls.

Lowering the temperature below the point where (B) is frozen has no influence on quantity of water removed. Neither does the length of time the potato is held in the total frozen state.

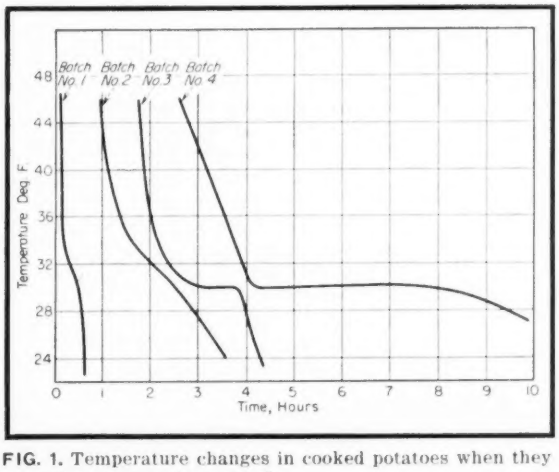


FIG. 1. Temperature changes in cooked potatoes when they were frozen at various speeds.

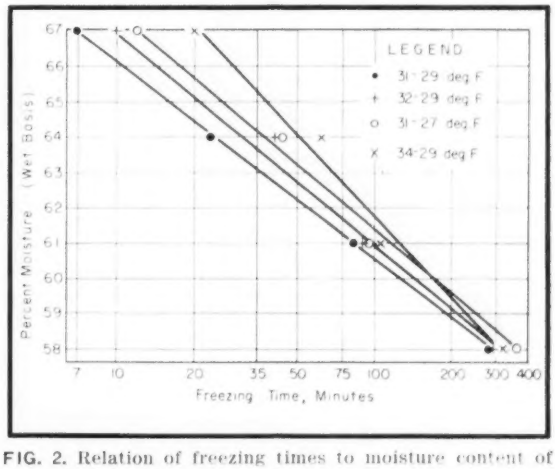
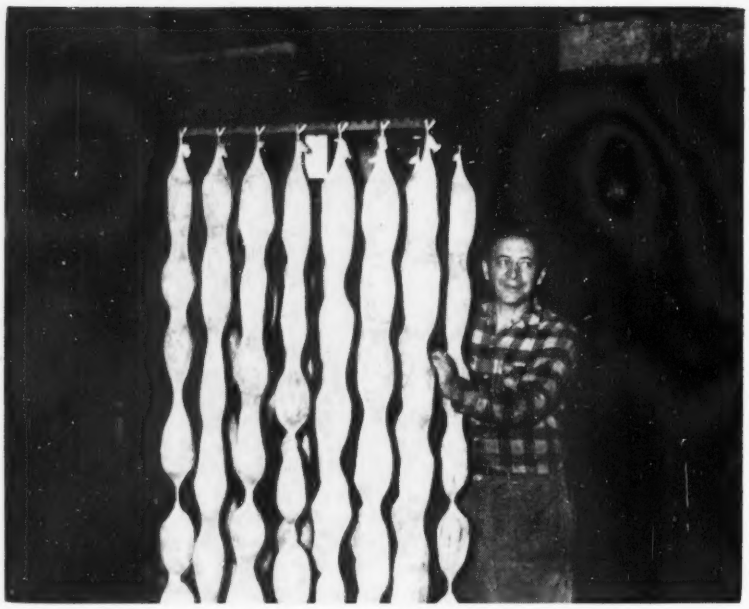


FIG. 2. Relation of freezing times to moisture content of pressed, thawed potato granules.

Special company safety team includes general employees—who quickly prove capable by spiking previously unrecognized "mishap makers"



"PUSH 'EM, don't pull 'em!" was wise anti-injury advice of a worker, who was first to foresee high danger of being ahead of a falling monorail load. Note how firm cuts handlings by loading six butts per stockinette.

Workers Spot

And Packing Firm's Accident Rate

IVAN C. MILLER
Assistant Editor, "Food Engineering"

Not only are accidents now much less frequent at John J. Felin & Co., Philadelphia meat packing concern, but also considerably less worker-time is being lost due to mishaps that do occur.

Especially credited for this decided improvement is the introduction of a safety-control committee made up of workers, as well as supervisors, on a rotating membership plan.

To spotlight the practical technique employed, here is a closeup examination of the system by which the control body is selected, how it operates to ferret out accident-pregnant conditions, and the results that have followed the activities of the training-patrolling group.

Committee Structure

Only one member of the group serves permanently—the company personnel director, to whom, as group secretary, the committee reports. Under this key department head, a nine-member team is trained to detect and remove all possible hazards to employee safety.

SAFETY GUARD was missing from this stapler. Only one man was aware it was gone. And an injury resulted. But today, everybody knows it's on (arrow), and fingers are safe.

Each member serves, without additional remuneration, for a period of one year. Retirement and replacement of members is staggered, so that two members end their term of office each 3-month period. In this manner, the new members have the benefit of the experience of those who have already served on the committee for 3 to 9 months.

Five members of the group are selected from supervisory personnel and four are chosen from the ranks of the workers. Any member of the group may be elected president.

Department heads send to the secretary their recommendations for worker members of the committee. Or, as occasionally happens, a worker may apply for the opportunity to serve with the safety group.

Selection for membership is based on several factors: The merit rating of the individual, his own accident record, and demonstrated awareness of causes of lost-time mishaps.

Appointment follows a vote by the entire committee membership of ten. Supervisors are similarly selected. Membership is not necessarily confined to a selection from department-head recommendations. The committee has the power to choose and elect anyone in the organization.

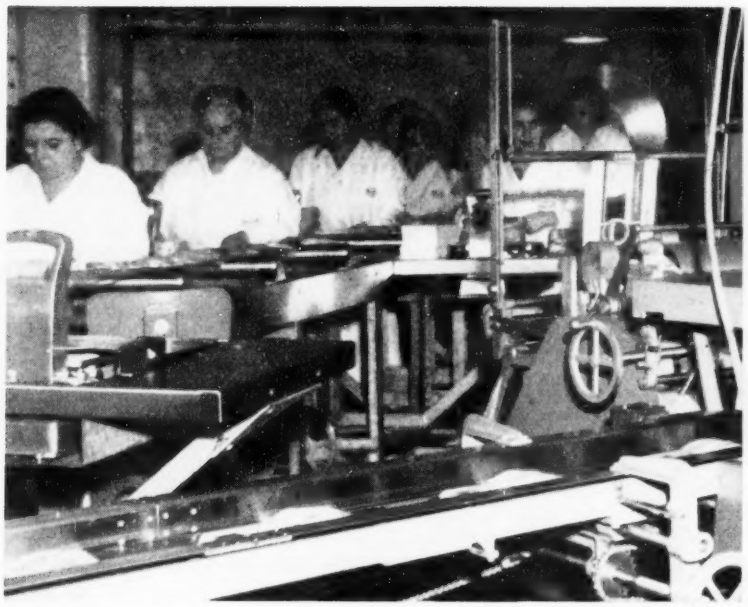
How Group Functions

General safety instructions are provided to members, and these are accompanied by safety literature. Then there is training, mostly derived from discussions during the twice-a-month meetings and from experience.

In addition to the regular meetings and the day-by-day duty of each committee member to be alert in detecting hazards in his own work area, a plant tour is conducted by the entire committee each 2-month period. Here is where a major importance of the committee, and especially the worker members, comes in.

For when it comes to observance of accident hazards by department heads, and even supervisors, too often there are cases of not seeing the trees for the woods. Operations and practices in one's own department are the constant routine diet of the heads and supervisors, therefore they tend to be commonplace and "accepted."

But to the "outsider"—the employee



MISHAPS have been driven down even where incentive pay presumably makes for extra vulnerability. Example is bacon packaging (above). Here, machinery is an "injury potential," but in past year not one accident has been sustained.

Plant Hazards

and Lost Time Plunge to New Low

from a different part of the plant—each of the other areas is a fresh pasture in which accident-hazard weeds are more likely to be noted than in his own domain.

Not only have the visiting committee members proved ready spotters of accident dangers not obvious to those stationed in the area, but it has been demonstrated that those who have served on the committee become extra vigilant in their own work areas. Rarely has there been a case of an avoidable accident to a retired member.

Moreover, both workers and supervisors spread the safety gospel, not only while serving with the safety group but after leaving it.

A further value of plant workers' services on the safety committee is dual in nature. That is, special ability of a worker to measure up to the demands of the new responsibility can earmark him as a candidate for promotion.

The fact is that a large portion of the corrective measures taken to eliminate safety menaces have been suggested by workers.

As an example, it was a worker who pointed out the danger inherent in *pulling* either loaded or empty racks suspended from monorails. Should a worker slip or stumble while pulling a rack, scraped shins might be the least of the injuries. Should a load jump from the rail at a switch intersection, the ton of weight falling on the worker pulling it could entail a very serious accident.

It is now a safety order issued, accepted, and practiced, to always *push*—never pull—to move any rack along its overhead rail anywhere in the plant.

"Watch Individuals!"

Also, take this case: In the company's sausage packaging department, transparent casings for ½ lb. and 1 lb. consumer packages are pre-formed by closing the ends of cellophane tubes on a stapling machine. And here it happened that the small safety guard —installed on the unit to prevent thumbs and fingers from being stapled —was removed and, contrary to instructions, not replaced.

Only the regular operator of the machine was aware the guard was gone. And eventually there was an accident. True enough, it was only a minor mishap. But it caused lost time.

By safety committee order, the guard device went back on the machine. It was emphasized that it was to be kept there, and no short-circuiting of this directive has occurred since.

Once it is put in action, a committee recommendation is the equivalent of a mandate—since safety takes precedence over operations. But where it appears that a safety measure might affect operations or production performance, there is a thorough discussion with the department head in question regarding its implementation.

The problem is usually one of means and method—how to remove accident hazards with minimum interference with smooth, efficient operations.

Workers Won Over

Sometimes, safety measures are not accorded immediate approval by the workers. However, if the hazard to be abolished is of sufficient magnitude, the program is tightly enforced—even to the extent of dismissal for rule violation. For instance, there is a strict ban on smoking in certain areas, and disregard of this dictate is "in the book" as a dismissal offense.

A specific hand-guard ruling is worthy of note. It was opposed by the employes affected. And it accordingly proved difficult to enforce.

But that was at the beginning. Today, it is fully accepted. Reason: The previously high accident-incidence dropped to near zero with use of the guard, and to the surprise of the workers, this safety record was attained without the anticipated loss of efficiency.

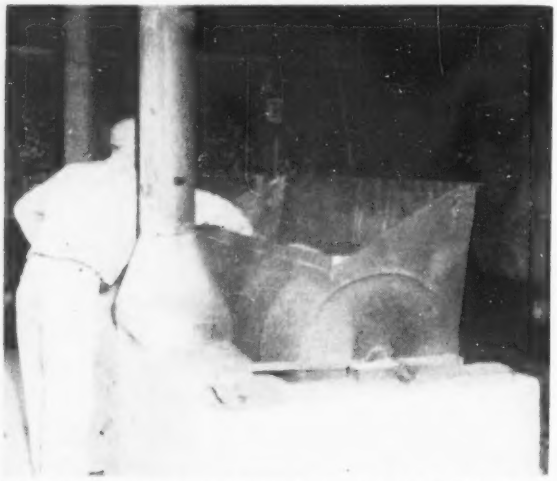
Here are the details—

When the knife wielders in the

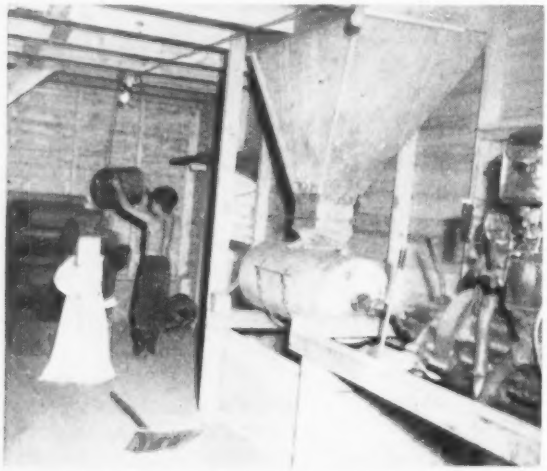
(*Turn to page 134*)

THERE'S WIDE READING of pointed safety tips, regulations, and committee announcements, which are interspersed on prominent bulletin boards with eye-catching popular items.

STALKS of wild rice form a veritable mat over this shallow Minnesota lake. Seated woman behind poling Indian is harvesting the grain with two long sticks.



PARCHING of the green grain is carried out in this wood-fired, agitated, two-section vessel holding 200 lb. Special supply of tamarack logs are seen in rear.



THRASHER (seen in foreground) consists of engine-driven drum with enclosed beater arms. Fanning mill (in rear) separates the kernels from the chaff.

TAMES WILD RICE

Paying business built by enterprising Minnesota company that tackled processing of special grain

FE STAFF

Some food products highly prized by man have not thus far yielded to advancing technology.

Take *manomin* for instance—known to the gourmet as wild rice. This delectable grain still bends to the whims of nature for its stand, continuing to be reaped by age-old methods which date back to forebears of the great Chippewa tribe in Minnesota and Canada.

Nevertheless, Holbert Bros., of Onamia, Minn., packer of over half of the world's crop of wild rice, can point to progress in "taming the wildness," insofar as making its processing a paying proposition.

But first a word about the grain: It seems that wild rice is *not* a rice. In fact it bears little resemblance to the cultivated grain. Actually, it's the seed of a water grass that grows in shallow northern lakes, and the grain itself is comparatively long, spindly, and gravish in color.

Some peculiarities of wild rice are that it acts more like a berry than a grain and will spoil quickly unless parched soon after harvest. Further, it ripens in sequence along the grass stalk—hence actual harvest from a plant may occur several times during a few intense weeks in early fall. This almost necessitates a crude manual type of harvest.

In northern Minnesota, the locale of this story, pairs of Indians go out in boats to harvest the rice. And even the best team—one poling the boat while the other picks the grain with two hardwood sticks—rarely brings in much over 100 lb. daily.

So it is easy to justify almost any price for wild rice. Merely finding and getting to a harvest requires incalculable wear-and-tear on trader and transporter. And the tedious, uncertain harvest—often in the face of crop-spoiling winds and rains—seems almost a labor of love considering the small quantity of the yield. Last fall's average "green" price of 60c. per pound appeared a model of reasonable juggling.

Three-Week Plant

Holbert's wild rice cleaning and parching facilities are well off the road—a collection of new, well-painted wooden buildings. Since this operation only runs abont three weeks each year and its total throughout is only about 25 tons of grain, it was surprising to see such a well kept plant.

But when one considers that well over $90,000 worth of the grain may be handled here in a few scant weeks, the need for precision and well-ordered operations becomes obvious.

While the drivers of incoming pick-up trucks have made direct cash purchase of grain by weight in the field, the batch is again weighed prior to its being forked into a long multi-bin open storage shed. Here, it is spread out

(*Turn to page 152*)

Speeds Plant Movements

New aluminum containers bring quick in-plant conveying of ice-packed poultry, seen here going into cold storage rooms (rear). Note (right) how empties stack in small space. They're cleaned in a jiffy, too.

Square, Light Shipper Ups Their Loads

And Minimizes Handling Labor

GENE IANNELLI

President, Queen City Poultry Co., Allentown, Pa.

How to haul more dressed chickens in trucks—with less back-breaking manual handlings—was the problem we grappled with at Queen City Poultry Co., Allentown, Pa.

The logical answer appeared to be substitution of small, square-shaped, lightweight containers for the old round, bulky wooden barrels. Such square boxes would enable our trucks to carry a cube load. And small, light containers would abolish heavy manual lifting and save costly time of workers.

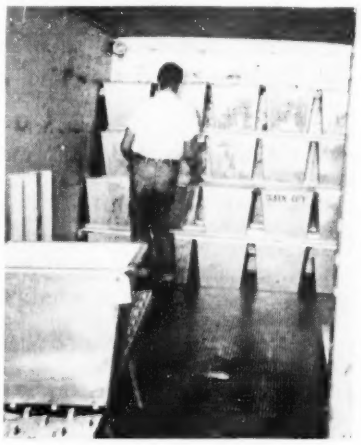
Investigation of various possibilities convinced us that this was the right approach.

▶ **Accordingly, we adopted square, nestable aluminum boxes—and were pleased to find that 25 percent more poultry could be loaded into our trucks.**

Since we operate ten trucks to our 50 Sunny Crest Farm poultry stores in Pennsylvania, New Jersey, New York and the New England states, this represents an important saving in trucking.

Empty, the light metal containers weigh only 7 lb.—as against approximately 40 lbs. for a barrel. And two aluminum boxes replace a barrel.

The old loaded barrels were so heavy that it took two men to stack them two high in trucks. Now only one man is required to stack the light containers to the ceiling of a truck and arrange them closer together.



Simplifies Loadings

Into truck they go—more easily and more efficiently than the old heavy barrels. And one man can do the job "right to the ceiling."

Handlings Simplified

Further benefits of the new boxes are found in the fact that extra handlings have been eliminated both at the plant and at retail stores.

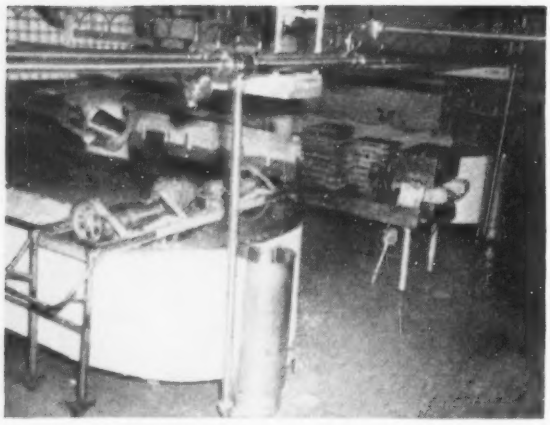
In the plant, live chickens are taken directly from trucks, suspended by the legs from a continuously moving conveyor, killed, defeathered, cleaned, and packed in ice within 12 min. Big stumbling block came after weighing the poultry and packing them in wooden barrels—the heavy barrels had to be hand trucked to trailers or to a plant-cold storage room.

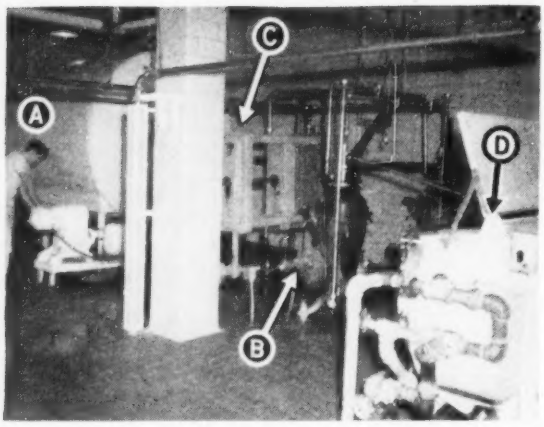
Today, the new baskets are placed empty on an aluminum roller conveyor that carries them to the packing station, then directly to trucks or the refrigerator. During their travel, the loaded baskets are weighed—a practice that wasn't feasible with vari-weight barrels.

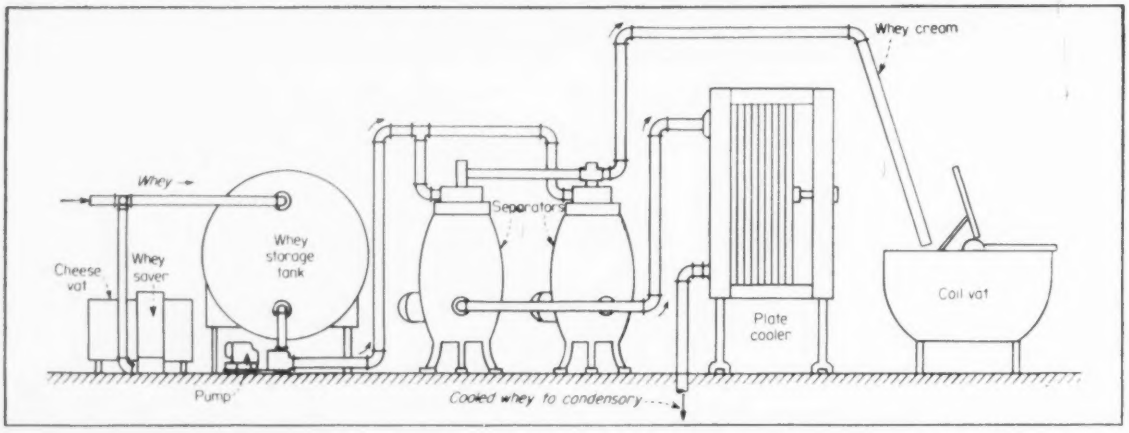
There is another advantage to this direct handling system—operating efficiency has been improved at the final cutting, weighing, and packing stations. The empty aluminum containers are nested in a corner, and they do not clutter these areas as did the barrels.

Two unnecessary handlings have been abolished at the retail shops. First, poultry is now carried directly into stores in the ice-packed aluminum containers. Formerly, it was necessary to dump the chickens from barrels into large cans, which the truckmen then hauled into the stores.

(*Turn to page 133*)







FLOW OF WHEY is from cheese vats (left photo) to storage tank (A) in right photo), then through two separators (B). Fat-free product goes through plate cooler (C) and into pipeline to condensory. Whey cream collects in vat (D). Accompanying flow diagram shows hookup of the units.

INTERCONNECTING pipes in tunnel link cheese and condensing plants. Glass pipes (left) carry whey and skim milk, also permit in-place cleaning. Shared utilities run in pipes on right, which are: Steam to cheese plant, condensate return line, sweetwater to condensory, return line for recooling sweetwater, and well water to condensory.

Speeds Whey Handling

Cheese plant saves space and hauling by efficient closed-system movement of 125 tons of whey daily. Unique pipeline tunnel serves adjacent condensory

FE STAFF

Since whey yield from cheese milk is about 85 percent, a veritable flood of this byproduct can be built up in the course of a day in a large cheese plant —and the mere storage and shipment of whey can be a major undertaking.

Lake-to-Lake Dairy Cooperative solved this poser in its advanced Kiel, Wis., plant by setting up a continuous system for separating and cooling whey as soon as it comes from the vat. Then, with no time or space lost, the byproduct is routed through underground glass pipe and delivered to surge tanks in a nearby Western Condensing Co. operation, where concentration to more usable form follows almost immediately.

Through this highly efficient vat-to-condensory system the Cooperative has not only conserved tank and floor space, but has also saved hauling charges and time required to divest itself of over 125 tons of whey daily.

Let's closely follow a batch of whey from a typical vat to the condensory to spot features of the system:

Whey is drained from a 15,000-lb.-capacity vat—there are seven—through a vat-height cylindrical "whey saver" that prevents loss of the product by overflow. A pump then moves the byproduct through overhead stainless steel piping into a 5,000 gal. surge-storage tank. Discharge of this latter tank is continuous by means of a variable speed drive pump which delivers at a desired rate to separators.

Two separators in parallel—with a

(Turn to page 196)

Corn Syrup Wins Place As Pickle Sweetener

Fully 50 percent of sucrose can be replaced by enzyme-converted product in high Baume pickles, 15 percent in low. In standard pickles, however, acid content must be reduced to insure acceptability with 15 percent corn syrup

F. W. FABIAN and HILLARD PIVNICK

Respectively, Professor, Dept. Bacteriology & Public Health, Michigan State College, East Lansing, Mich., and Industrial Fellow, A. E. Staley Mfg. Co., Decatur, Ill.

Enzyme-converted corn syrup may be used to replace a part of the sucrose in manufacture of sweet pickles.

This has now been confirmed by consumer panel studies with samples of low Baumé, standard, and high Bé sweet pickles, bread and butter pickles, and mixed sweet pickles.

For many years sucrose was used exclusively in the manufacture of sweet pickles. Then Fabian and Switzer[1] showed that corn sugar (also known as cerelose and dextrose) could be substituted for 25 percent of the former. In addition, they found that dextrose imparted to the pickles the desirable qualities of crispness, increased yields, and less shriveling.

War Promoted Syrup's Use

Corn syrup has been widely accepted in the baking, ice cream, and canning fields.[2] And during World War II, when sucrose was scarce, some pickle manufacturers utilized enzyme-converted corn syrup.[3] For this reason, an investigation was undertaken to determine the possibility of using Sweetose* in sweet pickles.

It was desirable to use pickles similar to those most commonly marketed. To accomplish this, analytical data[4] for several hundred samples of commercial pickles were obtained and average sugar, salt, and acetic acid contents thus determined were used in preparing the samples.

Sweet pickles were made from one-year-old salt stock of about 3600 size. They were desalted in running water, cut in $\frac{1}{8}$-in. slices, and covered with sufficient liquor to give the desired final concentration of ingredients.

Sweet liquor was made from commercial ingredients: Sucrose, Sweetose, salt, distilled vinegar, aluminum sulfate, and spice oil emulsion. All pickles contained 0.2 percent hydrated aluminum sulfate, and 0.025 percent spice oils. Spice oil emulsion consisted of 60 parts oil of cloves, 20 parts oil of pimento, 20 parts oil cassia emulsified with gum arabic in three volumes of water. The Sweetose was a 43 Bé, water-clean syrup. When used, it was substituted on a dry weight basis for an equal weight of sucrose.

Bread and butter pickles were made from fresh cucumbers of 2400-3000 size using one part onion to 200 parts cucumber. They were cut in $\frac{3}{16}$-in. slices which were covered with a 30 deg. salometer brine for 8 hr. Then brine was drained off and sufficient sweet liquor added to give the desired final concentration of ingredients after equilibrium between pickles and liquor had been attained.

Liquor for bread and butter pickles was made with sucrose, Sweetose, and soluble turmeric sufficient to give a final concentration of 0.0022 percent. One teaspoon of equal parts of mustard and celery seed was added to each quart.

Consumer Acceptance Studies

Packing into jars was not done until equilibrium between pickles and liquor had occurred—usually 24-48 hr. This insured uniformity of ingredients throughout the batch. The low Bé sweet pickles made from salt stock, and the bread and butter pickles were pasteurized at 165 deg. F. for 15 min. No spoilage was noticed in any of the pickles thus processed.

Testing was kept as simple as possible. Consumers did most of the tasting, but pickles were also sent to four packers who cooperated in the judging.

Consumer taste panels consisted of married students and their wives at Michigan State College. The college housing area accommodates about 1,800 such students. A survey of the geographical distribution of 294 students and their wives showed that 60.2 percent were from Michigan and the others were from 27 states or foreign countries. Average ages of the men and women were 27 and 25 years, respectively.

Cooperating pickle companies were distributed as follows: One in Illinois, one in Maine, and two in Pennsylvania. Three of them used experienced employees as tasters. The fourth company regularly employs a quality control panel, and all samples submitted were subjected to it.

Pickles were distributed to the student apartments in the late afternoon in three marked souffle cups, four to six slices per cup. Both verbal and printed instructions were given as follows: (1) Store pickles in refrigerators and eat them with evening meal; (2) drink water or eat bread between samples, and (3) write down on the paper provided, first, second and third choice, using the symbols printed on the souffle cup to identify the sample. Data were collected within one or two days after samples had been left.

Cooperating companies were supplied with jars of pickles and the same printed instructions that were given the consumer taste panels. Three companies returned data in forms similar to those used by the students, thus enabling the grouping of consumer and company panels for purposes of statistical analyses. Data from the fourth company was in a form unsuitable for grouping with the others. They are treated separately.

Statistical Analyses

Except for preliminary screening panels employing a small number of laboratory personnel, all tasters were requested to sample only three pickles at one time. One sample, the control, contained only sucrose as a sweetener, while the other two contained different amounts of Sweetose

*An acid-enzyme, dual-conversion, high-conversion corn syrup supplied by A. E. Staley Mfg. Co., Decatur, Ill.

substituted for part of the sucrose. The tasters' ratings of first, second, and third were assigned values of 1, 2, and 3, respectively.

The three samples were treated as two paired samples, with the all-sucrose control serving as one half of each pair and with each of the samples made with Sweetose serving as the other half. For example, if samples X, Y, and Z contained 0, 12.5, and 25 percent of Sweetose, respectively, then data of X and Y were analyzed as one pair and that of X and Z as the other.

Student "t" values were obtained and their significance determined. Those values marked with one asterisk are significant at the 5-percent level and those marked with two asterisks are highly significant—i.e. at the 1-percent level. Those not marked are not significant, the panels not finding significant difference between the pickles. A negative sign preceding the Student "t" value indicates preference for the all-sucrose control.

Low Baume Pickles

Preliminary investigations with 47 tasters gave evidence that 12.5 percent sucrose might be replaced with Sweetose in low Bé pickles (containing 2.2 percent salt, 12.5 gr. acid) without significant differences. However, when pickles containing 25 percent Sweetose were compared with those containing all sucrose, they were rejected. Therefore, low Bé pickles RR, SS, and TT, containing 0, 15, and 20 percent, respectively, of the sweetener as Sweetose were tested by the larger consumer panels and the commercial manufacturers. Results are given under "A" in the accompanying table.

It is apparent that the consumer tasters do not agree with those in industry with respect to acceptability of pickles made with 20 percent Sweetose, although they both agreed that 15 percent was acceptable. Therefore, it is likely that low Bé pickles made with 15 percent Sweetose would be acceptable but that any greater concentration might not be.

Standard Pickles

Preminary investigation with 43 tasters indicated that standard pickles (1.9 percent salt, 21.5 gr. acid), in which 37.5 percent or more of the sucrose was replaced with Sweetose, might be less preferred. Therefore, three groups were made and tested—viz., UU, VV, and WW, containing 0, 12.5, and 25 percent as Sweetose and, as a check on the preliminary screening panel, UU, XX, and YY, containing 0, 37.5, and 50 percent of Sweetose. (See "B" in table.)

Results indicate that standard pickles produced with Sweetose replacements are not as acceptable as all-sucrose pickles when the acid content is the same in both cases. Because Sweetose is less sweet than surcose and since sweetness and acid act competitively in pickles to produce suitable tastes, 9 sets of samples were made up to test the effect of decreased acid content. Results are given under "C" in the table.

Sample ND (18.6 gr. acid, 50 percent Sweetose) showed low acceptability by the consumer taste panel, and PJ (20.4 acid, 25 percent Sweetose) was even lower. Failure of commercial tasters to detect any significant differences between these pickles and the control KE may have been the result of participation of only one company with 15 tasters.

Samples KEX, PJX, and NDX, with 0, 25, and 37.5 percent, respectively, of Sweetose were then supplied to further test the effect of decreasing acetic acid content. These samples contained 22, 20.6, and 20 gr. acetic acid, respectively.

Results indicate that standard Bé pickles with 25 percent sweetener as Sweetose are not as acceptable to the consumer as those made entirely with sucrose even though acid content is cut to the point where the keeping quality of the unpasteurized pickles might be reduced.

Further tests were run to find out if 10 or 15 percent Sweetose would be acceptable. Three samples, KEZ, PJZ, and NDZ, containing 0, 10, and 15 percent, respectively, Sweetose and 22, 21.4, and 21.2 gr. acetic acid were prepared and tested. Results showed that the pickles containing 10 and 15 percent of the sweetener as Sweetose, but with less acid, were as acceptable as those containing all sucrose.

High Baume Pickles

Preliminary screening panels with 42 tasters indicated that high Bé pickles (2 percent salt, 20 gr. acid) containing 50 percent of the sweetener as Sweetose would be acceptable. To check these preliminary results, pickles containing from 0 to 75 percent of the sweetener were made and tested.

Data ("D" in table) show that in high Bé sweet pickles, 50 percent of the sweetener may be present as

(*Turn to page 138*)

How Taste Testers Rated the New Type Pickles

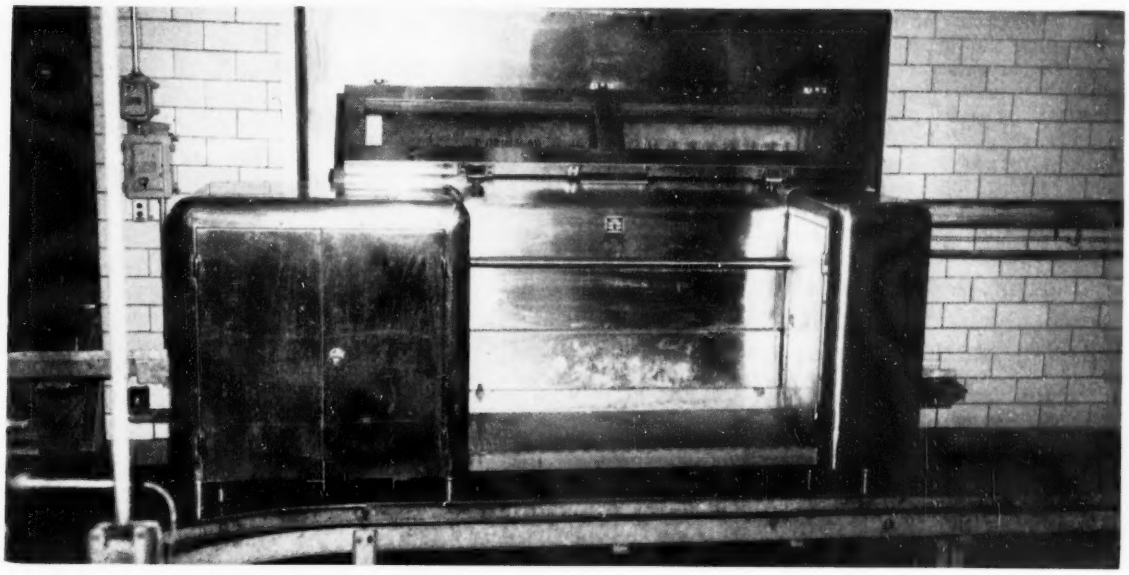
STATISTICAL ANALYSES of Organoleptic Tests

A—Low Baume Sweet Pickles

Pairs of Pickles Tasted	Consumers		Companies		
	Number of Tasters	Student "t" Value	Number of Companies	Number of Tasters	Student "t" Value
RR–SS	166	−1.78	3	26	−0.74
RR–TT	166	−2.73**	3	26	−1.24
B—Standard Baume Pickles					
UU–VV	233	−4.34**	3	22	−2.85**
UU–WW	233	−5.35**	3	22	−2.80*
UU–XX	205	−4.55**			
UU–YY	205	−3.87**			
C—Standard Baume Pickles With Reduced Acid					
KE–PJ	149	−1.89	1	15	+ .56
KE–ND	149	−2.90**	1	15	.00
KEX–PJX	335	−2.20*			
KEX–NDX	335	−3.86**			
KEZ–PJZ	242	+1.30			
KEZ–NDZ	242	−1.78			
D—High Baume Pickles					
ZZ–A.1	241	+0.20	3	29	−1.37
ZZ–A.2	241	−1.30	3	29	−1.61
ZZ–A.3	187	−0.62	3	31	+0.47
ZZ–A.4	187	+0.60	3	31	−0.44
A.5–A.6	150	−3.48**	3	31	−4.80**
A.5–A.7	150	−5.26**	3	31	−5.20**
E—Bread and Butter Pickles					
BB.1–BB.2	156	−2.69**	2	20	−1.60
BB.1–BB.3	156	−4.33**	2	20	−2.93**
BB.4–BB.5	116	−3.32**	2	17	−1.66
BB.4–BB.6	116	−3.05**	2	17	−0.97

* Significant result
** Highly significant result
− Preference for pickles without Sweetose
\+ Preference for pickles with Sweetose

NEW EQUIPMENT & SUPPLIES



Rapid-Freezer Handles Multi-Sized Packages

New, automatic, continuous rapid-freezing machine is capable of handling packaged foods in a wide variety of shapes and sizes.

Designated the Votator continuous package freezing unit, it is reported to save substantial space and reduce manpower and utility costs in food freezing operations.

New apparatus consists of continuous freezing conveyor, automatic loading and unloading facilities, and refrigeration coils and fans. Unit's frame is fabricated from structural shapes of simple design and its operating mechanism operates at very low speeds, holding maintenance costs to a minimum. All component parts are accessible for easy cleaning in place.

Unit's self-contained conveyor system can handle most all standard package sizes and shapes on a production-line basis. Variable-speed drive permits conveyor to be synchronized with plant production rate. Holding time in freezing zone can be varied from 40 to 120 min. while equipment is in operation.

Rapid freezing in apparatus prevents formation of large ice crystals in product and thus improves its texture, taste and sales appeal. It fully utilizes employees' time by delivering frozen packages at a fixed rate and eliminating stacking and restacking. Time also is saved in defrosting, equipment requiring less than 3 hr. to bring freezing chamber to room temperature, and less than 1 hr. to lower it to operating temperature of minus 30 deg. F.

Capacity of apparatus depends on sizes of packages and product to be frozen. For example: Under prescribed conditions rectangular pints of ice cream can be processed at a rate of 450 gal. per hr. In this operation, conveyor will discharge packages with a temperature of 5 deg. F. at center of product. Center temperature will then drop and level out at 0 deg. F., or lower, within a few minutes.

Finned-type refrigeration coil banks in freezer system are galvanized to give better heat transfer and prevent corrosion. Adequate refrigeration surface insures minus 30 deg. F. air temperature with minus 40 deg. F. ammonia when operating under a full load. A series of baffles give even distribution of cold blast in freezing chamber.

Dimensions of freezer equipment are: Length 19 ft. 7 in., width 9 ft. 8 in., height 8 ft. 6 in. With space allowed for cleaning, maintenance and plenum chamber for air distribution, the entire unit occupies less than 450 sq. ft. of floor space. Head space needed is 12 ft.

In operation, pre-filled food packages are loaded on conveyor section fitted with an automatic gate. Gate is mechanically opened once each loading cycle and a pusher mechanism moves packages to loading table. Here a pusher transfers them to one of 105 trays suspended between continuous conveyor chains.

Extruded aluminum trays, 8½ by 84 in. are subjected to a number of vertical passes in freezing chamber until pre-set cycle is completed. Trays (100) are in direct cold blast at all times and are prevented from tipping or overturning by a planetary arrangement and a series of baffles and guides. Frost-free sight door permits constant observation of freezing cycle.—*Girdler Corp., Votator Div., Louisville 1, Ky.*

Circle 99A on Reader Service Card

Accuracy, Dependability Mark New Instrument

Designed for use where the flow range is narrow, Flo-Watch Model AFUAQ is stated accurate and dependable in metering liquids, steam, air, and gas. It gages flow through standard differential producers such as venturi tubes, nozzles, and orifices, and is also designed for use with Kennison open nozzles, flumes and weirs. Instrument is reported adaptable for any combination of totalizing, indicating or recording functions.

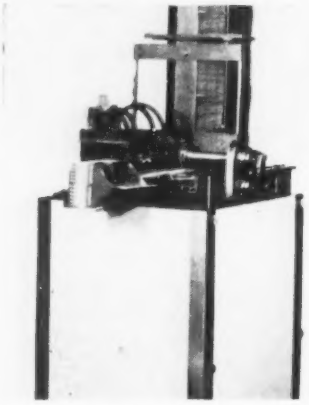
Totalizing model with transmitter attachment can actuate a secondary instrument or pace a chemical feeder remotely located. Functions of secondary unit will be in direct proportion to flow. A summation meter also may be operated from simple trans-

mitting attachments to total flow readings of a number of meters. Only electrical connections are required from transmitter, allowing summation unit to be located wherever convenient.

Totalizer reads directly in quantity units such as gal. or cu. ft., and indicator scale and chart graduations are arranged to provide maximum readability throughout measuring range from 25 to 100 percent of full scale.—*Builders-Providence, Inc., 345 Harris Ave., Providence, R. I.*

Circle 99B on Reader Service Card

Portable Machine Opens Cartons Automatically



Savings in labor and material are reported with use of recently developed portable automatic carton opening machine.

Machine operates on a suction principle with four rubber cups coming in contact with one side of the collapsed carton and bringing it into position while locking the bottom at the same time. Up to 70 6-bottle beer or soft drink cartons can be opened per minute, it is claimed.

Unit, completely self-contained, can be used continuously on any beverage bottling line at varying speeds or can operate intermittently when required. Equipped with casters, it can be moved to any desired location.

Besides saving labor, opener saves cartons often discarded by plant employees who do not take time to open them carefully. Particularly in its use with soft drinks and returnable beer bottles, it improves inspection by permitting time for thorough examination for broken glass, cleanliness, and general appearance of cases returned from trade. It reopens used cartons that have been sorted and knocked down.—*Atlanta Paper Co., P. O. Box 4417, Atlanta 2, Ga.*

Circle 100A on Reader Service Card

"Low-Bed" Frame Simplifies Product Handling

Speed and ease in loading and unloading operations are claimed for new model delivery truck. "Low-bed" frame that lowers the body level 12 in. does the trick.

New models, in the 3000 line, are in production following extensive preannouncement testing in actual service in various parts of country.

"Drop" frame requires no altering, cutting or welding by body builders. Lowering of body can be readily utilized for substantially greater body capacity within easy reach of driver-salesman. Door heights are lowered for easy access to load with minimum stretching and reaching. This results in time savings, both when truck is loaded at plant, and in making deliveries on route.

Early tests in addition to time savings, also indicate improved sales volume because of savings in energy and improved access to product line.

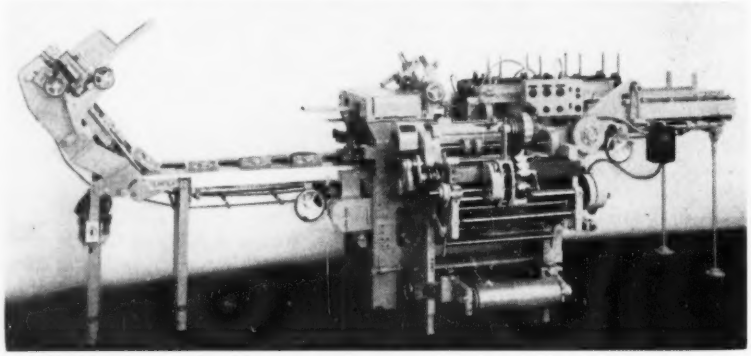
New trucks incorporate short wheelbase, short overall length, good visibility and safety, low cab floor; and short turning radius offers advantages for delivery service in traffic and congested areas. Model 3000 has a 110 hp. Mustang engine providing adequate power for delivery service on suburban runs.

In dairy industry service, typical body design on model permits 1,680 gal. of bulk ice cream capacity, with space for refrigeration unit mounted in compartment at front of body with separate dry compartment above.

For wholesale milk delivery, capacity of 200 12-qt. wood cases can be obtained or substantially more where square or paper bottles are used.—*White Motor Co., Cleveland, Ohio.*

Circle 100B on Reader Service Card

Wraps 50 to 70 Large Cakes Per Min.



Sweetgoods and large cakes can be wrapped at speeds ranging from 50 to 70 a min. by Model 47-B machine.

Advantages claimed for new unit besides labor saving of wrapping at high speeds are said to include: Quick adjustability from one size to another (5 to 8 min.); continuous flow handling of product through machine—does not disturb layers or mar icing on cake; ability to handle wide range of sizes and shapes.

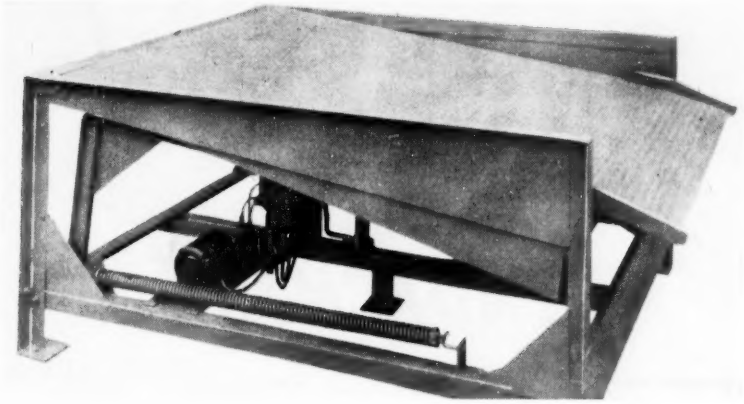
New model can be adjusted to accommodate packages within the

following range: Length, 4¾ to 13 in.; width, 3¾ to 8 in.; height, ½ to 4½ in. Unit is able to handle round articles such as angel food, layer and sponge cakes, rectangular shapes.

Machine has been designed so that almost any accessory for modern merchandising can be added to fit customer's requirements, such as an automatic card and U-board feeder; thermoplastic labeler; imprinter; and electric eye for printed papers. Unit handles usual types of self sealing papers used for baked goods, such as MST and LST cellophane, waxed glassine and waxed papers.—*Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich.*

Circle 100C on Reader Service Card

Loading Ramp Unit Is Portable, Adjustable



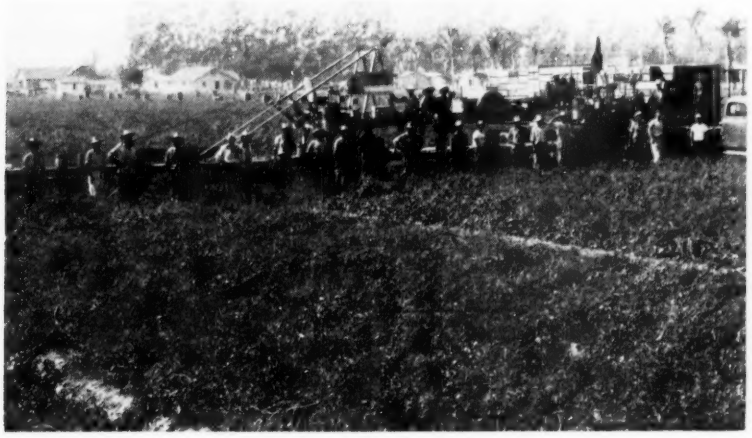
Two outstanding features mark this new loading ramp. It is both portable and adjustable.

Unit, according to maker, can be installed in 5 min. at any loading dock and its hydraulically operated deck adjusted to any truck bed in a few seconds. Ramp is shipped assembled.

Available in two models, manual and electrically powered, ramp has been reported to cut loading costs by as much as 75 percent, effecting savings in both time and labor. Electrically operated unit requires 110 v. outlet.—*John B. Illo Engineering Co., 2414 E. 57th St., Los Angeles 58.*

Circle 101A on Reader Service Card

Machine Speeds Tomato Harvesting, Cuts Waste



New tomato harvesting machine eliminates one step in use of field lug boxes, increases harvesting speed, and cuts down on crop wastage.

Called Produce Loader, it was tested by manufacturer in conjunction with Hunt Food Co., Fullerton, Calif.

Equipment consists of a 70-ft. conveyor belt sustained on a frame mounted on four rubber tire, power-driven wheels. Wheels roll down furrows of from 10-12 rows of tomato vines. Crew of pickers in front of belt fill buckets with fruit and empty them directly on the continuously moving conveyor belt.

Truck containing empty field boxes travels alongside unloading end of conveyor belt machine. One man on loading platform removes empty boxes from truck, fills them with fruit pouring off belt and returns full box to truck to be stacked.

Thus, unloading empty boxes, or picking up full boxes from field is eliminated, and pickers do not have to bother with field boxes as they travel down rows. Damage to fields during first picking caused by throwing empty boxes from trucks along rows is avoided. New machine also makes it possible to save green fruit, which is harvestable a week to ten days after first—and largest—crop is removed.

Without lug boxes, pickers are able to travel faster and pick more fruit, and fewer workers are needed. Men loading field boxes from conveyor belt have an opportunity to inspect fruit and discard culls before they reach cannery, saving time on processing line.

Loader is equipped with its own engine and can be turned at 90 deg. angles. It has a maximum speed of 20 mph.

With minor adjustments machine can be used to harvest other crops; melons, cucumbers, cabbage, lettuce, and peppers. Machine also can be adapted for spraying growing vegetables that it later harvests.

Extra equipment carried by loader during testing operations was a loudspeaker radio which played Mexican music, and large insulated water containers.—*Likens Manufacturing Co., Los Angeles, Calif.*

Circle 101B on Reader Service Card

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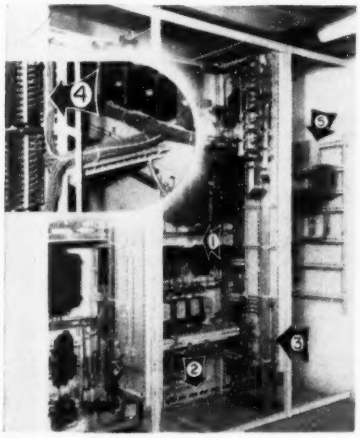
Automatic Control Panel Has Many New Features



Five advancements in design and construction of automatic control panels are claimed for new assembly. They are aimed toward installation of more instruments at no increase in operating space or sacrifice of maintenance ease.

New developments, illustrated in rear view of panel above are:

(1) Complete accessibility provided through utilization of vertical support areas. These, systematically spaced, divide panel into bays of associated instruments and operating lines.

(2) Control room floor openings and external tubing and wiring conduits may be completed in advance of panel installation. Panel bay widths are easily determined once major instruments have been selected and located.

(3) Tubeways have been created to provide centralized distribution points. Panel tubing is concentrated on sturdy vertical supports designed to carry all necessary instrument control lines and meter pressure lines from remote points to panel mounted instruments.

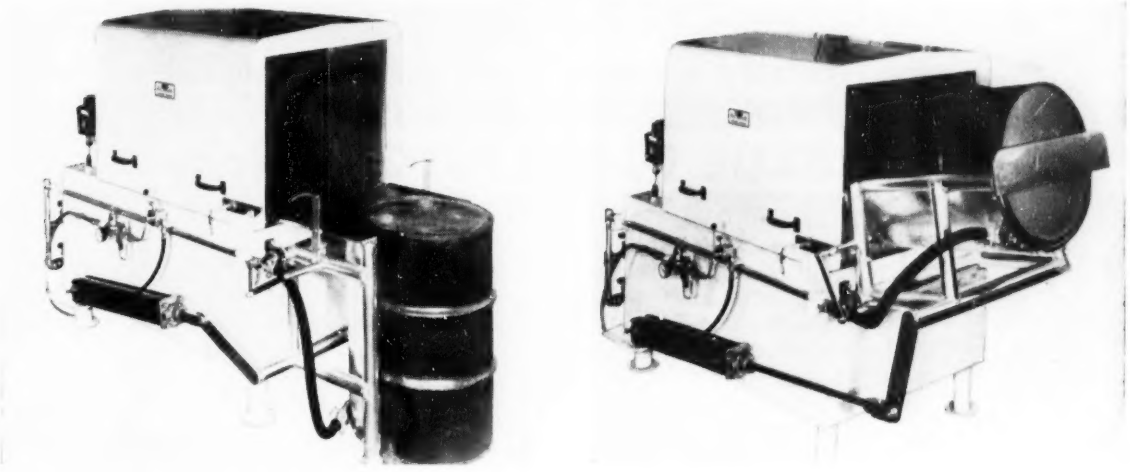
(4) Wireways enclose well-marked, compact, but easily accessible electrical terminal blocks. Installing, testing, and tracing procedures by user can be done in minimum of time, or possible error. Additional terminals may be added without obstruction to existing facilities.

(5) Adjustable wall racks facilitate mounting of any make control boxes, alarms, relays or breakers. Construction also permits installation of additional equipment without welding special mounting pads to panel walls.

In panel above, maker states approximately 12 sq. ft. of additional equipment and tubing may be mounted without affecting accessibility to instruments and controls.—*Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10.*

Circle 103A on Reader Service Card

For Fast, Easy, and Sanitary Handling of Shortening



Speed, simplicity and improved sanitation in handling shortening and lard is offered with use of new compact equipment unit.

Known as Auto-O-Melt, machine is said to provide rapid, accurate means of melting and scaling lard or shortening and immediately distributing it to one or more mixers, pan greasers or doughnut machines. Unit can be located at any point remote from mixers and near shortening storage area.

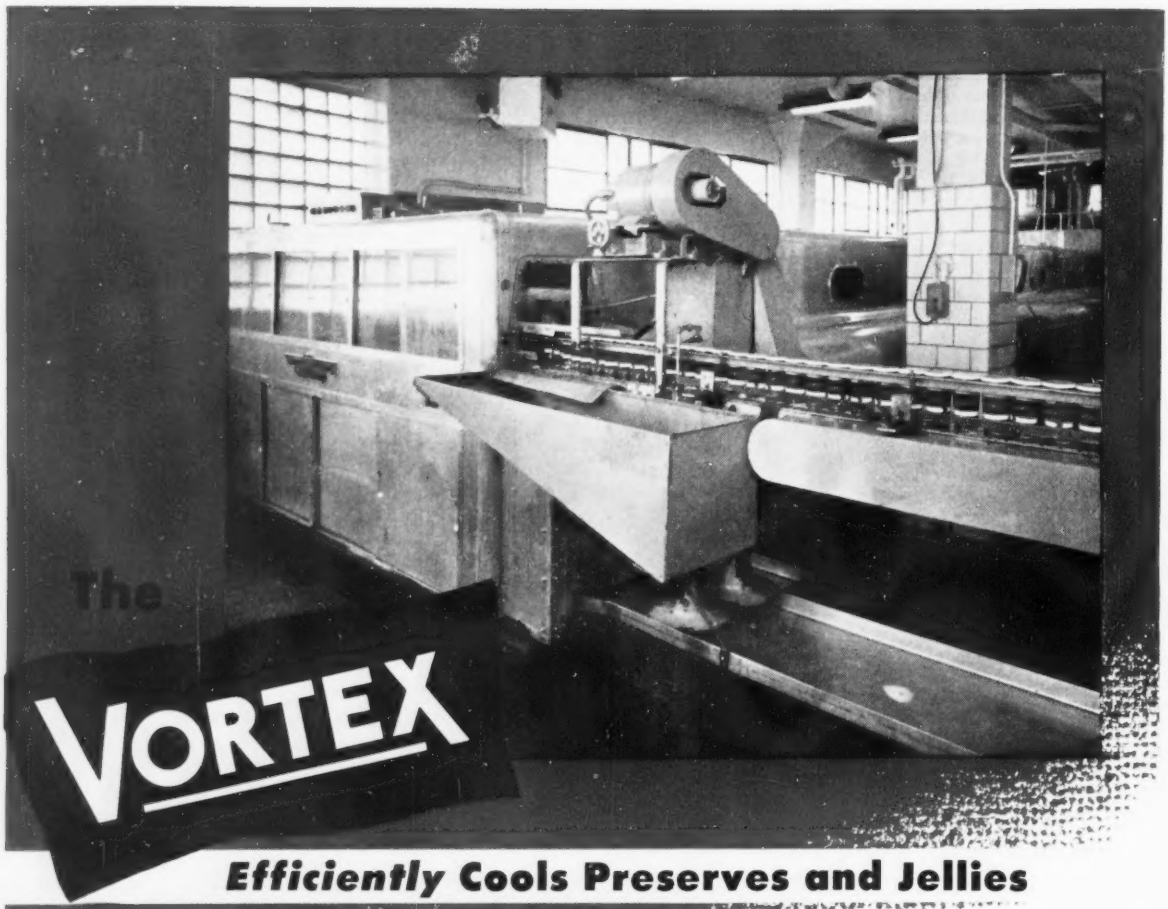
Pneumatically operated cradle in which drum is lifted from floor contains a steam-heated element which raises temperature of drum to a point where shortening will slide into melting tank. Loss of shortening on walls of cold drums is eliminated.

Within tank are two sets of steam-heated coils. One reduces solid shortening into thin strips. Second set completes melting process and maintains shortening at proper temperature in a liquid state.

Steam heating coils within tank offer definite advantages. Temperatures are low enough so burning or charring of grease on heating elements does not occur, even when level of grease in tank is low. Lower temperatures eliminate danger of fire resulting from overheated elements.

Circulatory distribution system between unit and flow meter is also steam-heated, and magnesia insulated. This portion of system is heated prior to distribution of shortening. After pump has been started, shortening is continually circulated between melter and meter.

Once system is in operation, steam heat is no longer necessary as shortening will maintain pipes at proper operating temperature. Operator has accurate control of distribution of shortening to any one of a series of mixers through individual gate valves. Exact quantity of shortening delivered to mixer is indicated on large flow meter. Delivery of 40 lb. of shorten-



Efficiently Cools Preserves and Jellies for BLUE PLATE FOODS, Inc.

As in many other installations throughout the food industry, the Barry-Wehmiller "Vortex" processor is used to cool preserves and jellies in the New Orleans plant of Blue Plate Foods, Inc. Whether used as a cooler, freezer, pasteurizer or exhaust box, this versatile machine has thoroughly proven its ability to speed up production, assure highest quality of product, with extremely low maintenance and operating expense.

The famous, time-proven Barry-Wehmiller engineering refinements include the "walking-beam" conveyor, atomized spray system of heat transfer and low power hydraulic drive. The automatic, continuous operation of the "Vortex" is cutting food processing costs in a wide variety of applications throughout your industry.

For complete information on the Barry-Wehmiller "Vortex" and its many processing uses, write for bulletins and outline your requirements today.

BARRY-WEHMILLER MACHINERY CO.

4660 WEST FLORISSANT AVENUE · ST. LOUIS 15, MO.

ing requires approximately 40 sec. Piping system between meter and mixers is electrically heated and fully insulated.

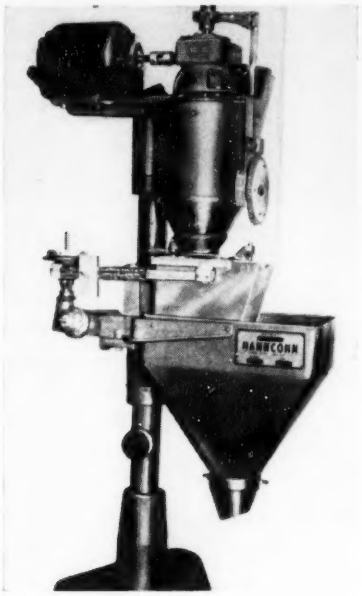
Temperature of shortening in unit and complete distribution system is thermostatically controlled.

Low level of shortening in tank is indicated by a warning light on top of unit. Extension of warning system can be provided on mixing platform.

Easily removed, fine mesh, stainless steel screen removes foreign materials from melted shortening. Melter and its entire distribution system can be drained through single valve. Sanitary maintenance is facilitated by opening in bottom of tank through which cleaning materials can be drained.—*Read Standard Corp., York, Pa.*

Circle 103B on Reader Service Card

Semi-Automatic Filler Is Fast, Accurate



Coffee, tea, rice, beans and similar materials can be accurately and speedily weighed with semi-automatic machine.

Called "Clipper", unit can be readily installed and put into operation within a few minutes. Skilled help is not required to install or operate it.

Unit is termed capable of handling packages ranging in size from 2 oz. to 1½ lb. Accuracy is stated as ½ oz. on 4 oz. or less, within ⅛ oz. on heavier weights depending upon material. Machine will handle coffee, Silex sizes 2 to 3 oz. at 30 units per min.

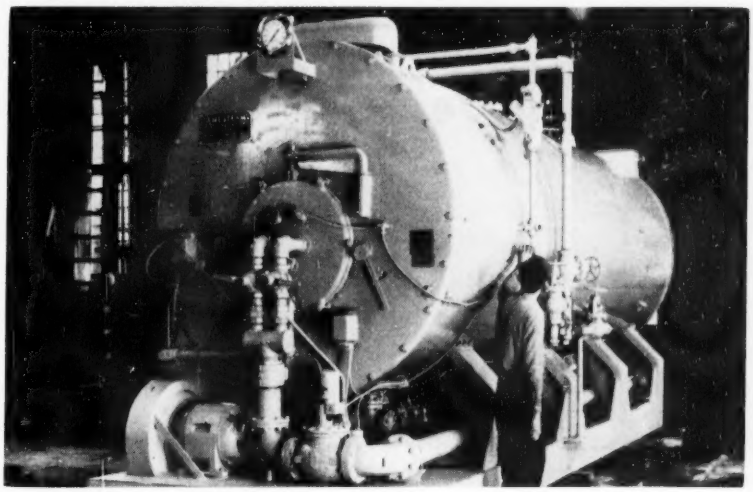
To operate, place material to be weighed into any desired size supply hopper. Then snap switch to "on" position and manually open valve gate. Material will flow uniformly into weighing bucket. When weight desired is in bucket, it will automatically cut off flow, dump and start weighing a new charge. If speed is not as desired, simple twist of control dial will increase or decrease speed as desired.

Once in operation, unit is completely automatic. Operator only places container into position at whatever speed has been chosen.

General specifications are: Overall height: 48 in.; size of feed inlet 6 in. dia.; height from table to tip of discharge spout: 7½ to 10 in., depending on container; power, ¼ hp. standard motor 110v, 60 cycle a.c.—*Hamicomm Machine Co., Inc., 180 Lafayette St., N. Y. C. 13.*

Circle 105A on Reader Service Card

Inspection, Service Ease Mark New Generator



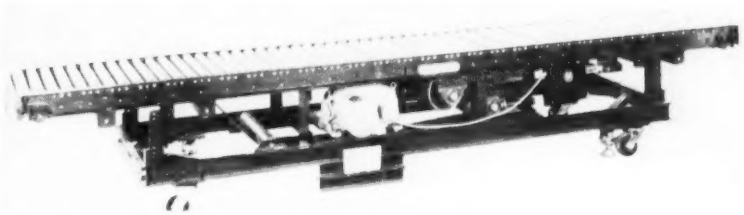
Complete accessibility to all parts marks this new 600 hp. generator which has recently been added to the manufacturer's line.

Twenty sizes are available ranging from 10 to 600 hp. with pressures of 15 to 200 lb. steam. Firing is gas, oil, or gas-oil combination.

Fully automatic machine is self-contained, ready for operation when connected to customer's utilities—steam, water, fuel, and electric lines and breaching or stack.

Automatic controls are in an eye-level panel box on far side of unit. Burner head and flue cover are davit-hinged to simplify inspection and servicing. Rear door is also davit hinged, as in one-piece rear baffle which saves time each time unit is opened for cleaning and inspection.—*Ames Iron Works, Inc., Box R-2, Oswego, N. Y.*

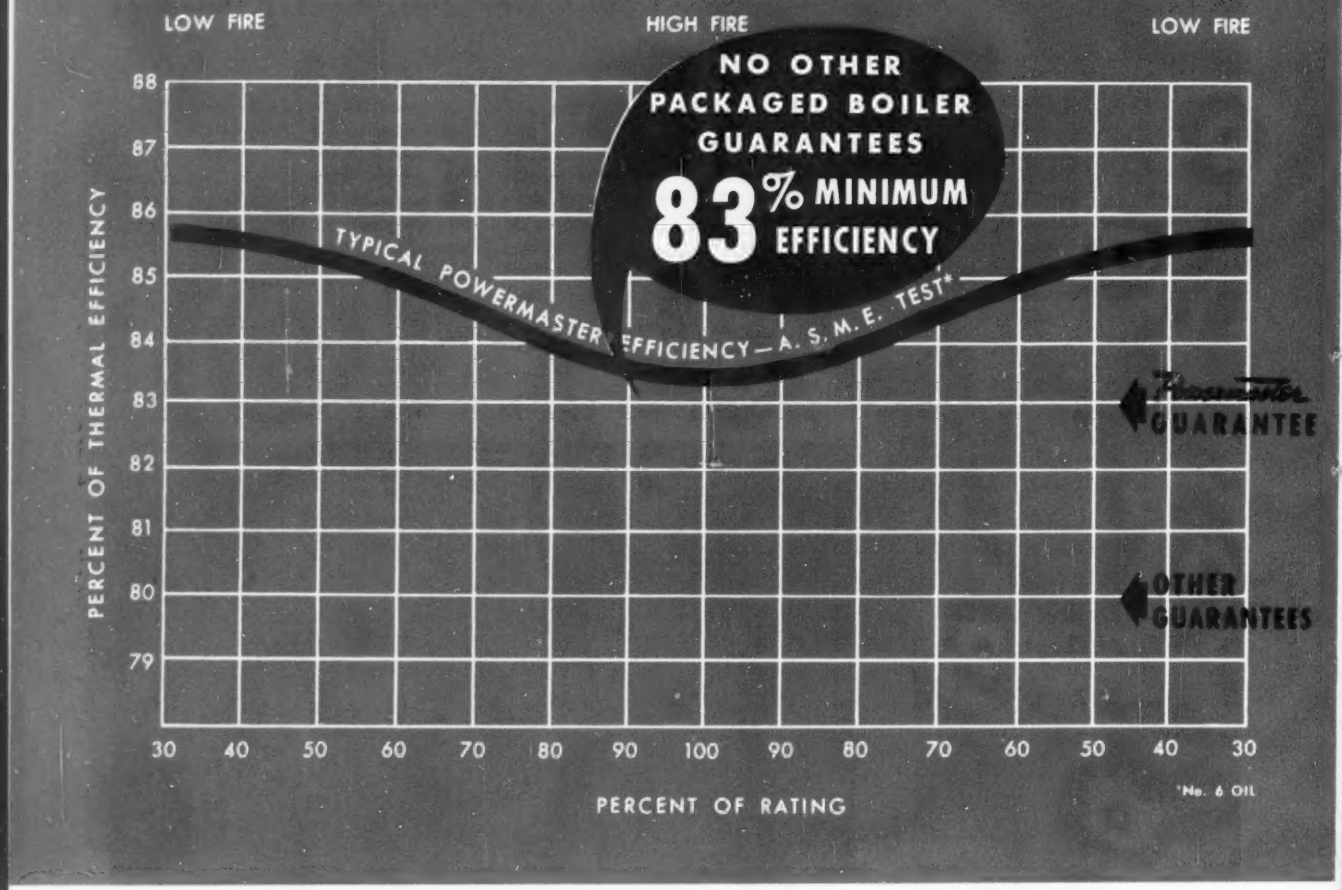
Circle 105B on Reader Service Card



Movable Unit for Fast, Easy Sorting

THIS LIVE ROLLER, portable conveyor can be readily used as sorting unit. Roller surface makes it easy to move packages from side to side or to slide in loading or unloading.—*Standard Conveyor Co., North St. Paul 9, Minn.*

Circle 105C on Reader Service Card



Only Powermaster guarantees 83%!

The "pay-off" on a boiler is its operating efficiency!

Take a look at this typical efficiency curve of POWERMASTER . . . then compare A.S.M.E. tests with those of any other boiler! At less than full load (which is normal in field operation) notice that POWERMASTER efficiency actually *increases.*

There's a reason for such efficiency. The POWERMASTER is the development of 68 years' experience in boiler manufacture. Continuing research and progressive engineering have consistently been reflected in POWERMASTER design:

- **FIRST to provide the Voriflow air-atomizing burner.**
- **FIRST to provide full modulating cam control.**
- **FIRST to provide immediate change-over from oil to gas firing.**
- **FIRST to provide a *complete* packaged unit.**

Point-by-point, POWERMASTER welcomes comparison. Before deciding on a new boiler for your plant, be sure to get the facts on the new POWERMASTER with VORIFLOW combustion. Just drop us a line and we'll be glad to send you complete information.

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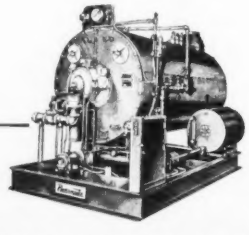
PACKAGED AUTOMATIC BOILERS

In sizes to 500 HP; pressures to 250 psi.



ORR & SEMBOWER, INC. • *Established 1885* • 940 MORGANTOWN ROAD, READING, PENNA.

Portable Viner's Weight, Size Down, Efficiency Up

A decade of experimental work has gone into development of this new portable viner combine. It threshes conventionally, but changes incorporated have decreased unit's size and weight and increased its efficiency, while capacity remains the same. These changes reportedly lower maintenance and field handling costs.

Combine, pulled by light tractor at ground speed of approximately ¾ to 1 mph., has an improved pickup which loads vines that had previously been cut and windrowed into viner feeder.

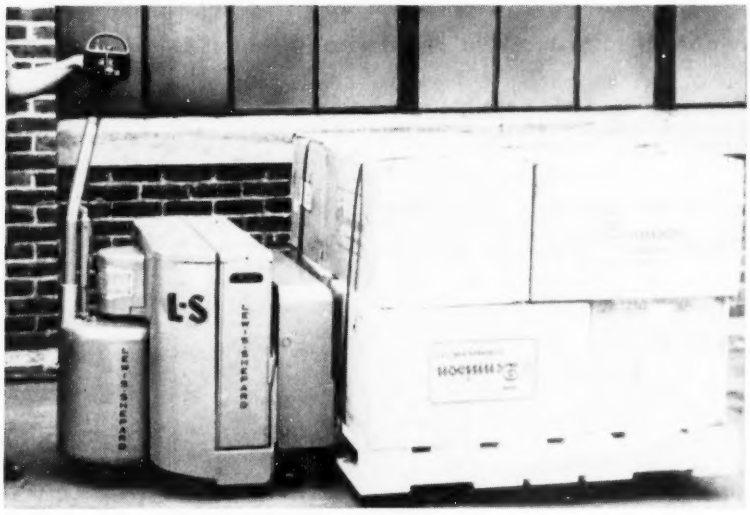
Conveying device, a part of combine, permits threshed commodity to be delivered into containers. Vines are discharged into field, which permits this source of humus to remain on ground, or to be picked up later for feed. It also eliminates vine stacks at canner's plant or viner station.

Hauling costs can be minimized since only threshed commodity is transported and handled. Reduced handling permits increased distances.

Smaller size and lowered weight permits combine to be mounted on standard implement tires. It is also equipped with a hydraulic leveling device to compensate for slight irregularities in terrain. Combine is powered by a four cylinder, air-cooled power plant of sufficient size for economical operation. Maker states number of these combines available for 1953 season will be limited.—*Scott Viner Co., 1224 Kinnear Road, Columbus 8.*

Circle 107A on Reader Service Card

Increased Power, Shorter Length Mark New Truck



Improved operation on ramps, grades and less space normally required for maneuvering are advantages cited for this low-lift walkie truck designed along new lines. Increased power and a shorter overall length do the trick.

Other operational advantages cited for the truck are:

Quicker control over any maneuver is provided by incorporating all controls in handle head. Additional aisle space is saved by having controls operate with handle in any position including vertical. Handle does not have to be extended down from full back position to disengage brake and make controls operable.

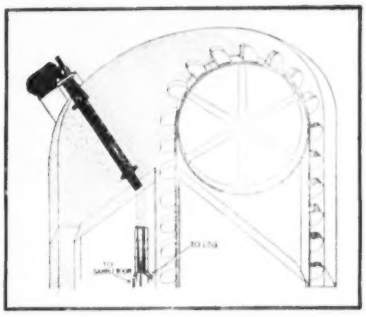
Faster and safer operation is afforded by electric "deadman" type brakes. Operator simply releases pressure on handle "trigger" and gets instant cushioned braking action.

Smooth operation is provided by timed acceleration. Operator presses handle trigger all the way and speed picks up, regulated by timing device giving jerk-free starts.

Truck is available in either pallet or platform type. Capacity is 4,000 to 6,000 lb.—*Lewis-Shepard, Watertown, Mass.*

Circle 107B on Reader Service Card

Automatic Sampler Gives Fast Check on Grain



Incoming or outgoing grain can be speedily and accurately checked with use of this automatic sampler, it is claimed.

Samples taken are reported accurate enough to establish grade of a blend. Its use eliminates costly hours of labor normally required to manually take sufficient samples for accurate grading. For shipper, it cuts out delay in loading cars and setbacks occasioned when a loaded car does not reach required grades.

Construction is simple and durable and action is termed positive and precise. Holes open every six seconds to admit sample of grain being dumped from cups in elevator head casing. Sample passes through a divider. A portion is returned to elevator leg and balance goes directly to sample room.

Installations are simple and quick. Units are made for one to four tubes and one to four strings of cups.—*Seedburo Equipment Co., 734 Converse Bldg., Chicago 6.*

Circle 107C on Reader Service Card

It's almost unbelievable!

Sealva FLAVORS!

The New Hermetically Sealed are showing some remarkable performances.

In GELATIN DESSERTS, Sealva Lime flavor far outlasts other protected flavors in extended shelf tests.

In BOXED CHOCOLATES, Sealva flavored mints maintain their original strength and do not permeate other confections.

In PHARMACEUTICALS, Sealva Orange has done the impossible in a pleasant permanent taste mask in powders and tablets.

Sealva fruit flavors have made possible revolutionary new products in PREPARED MIXES and DESSERTS.

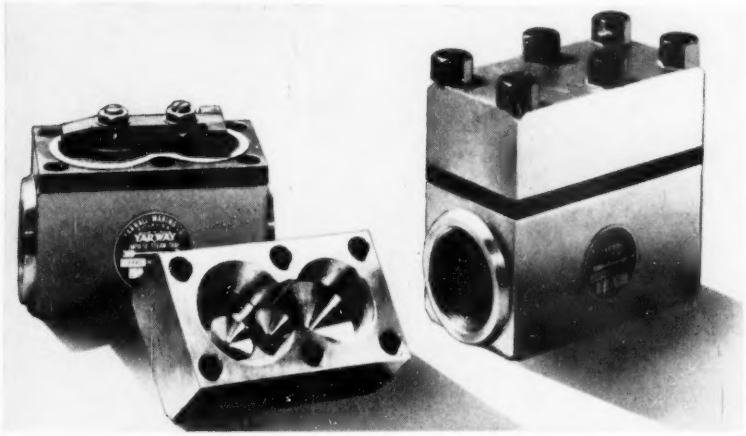
Sealva flavors are dry powders. Each droplet of flavor oil is completely sealed from the atmosphere with an edible protective film.

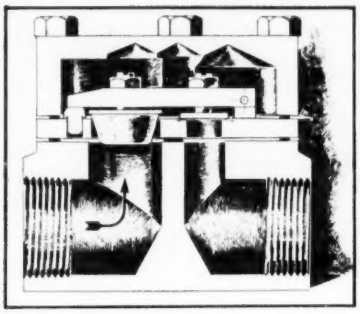
VAN AMERINGEN-HAEBLER, INC.
521 West 57th Street
New York 19, N. Y.

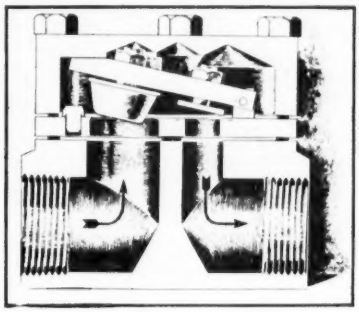
Alva FLAVORS

For more information, use coupon on page 157.

Impulse Steam Traps Are Compact, Light in Weight







Recently developed for use where condensate must be handled in large quantities are impulse steam traps known as Series 50.

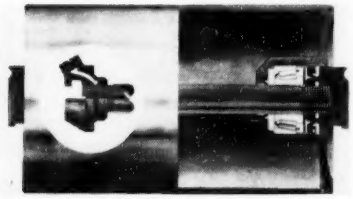
Feature of these traps is their reported ability to maintain high, even temperature in process equipment. Compactness and light weight make them desirable where close quarters piping is involved. For instance, 1¼ in. size is 5½ in. long x 5 in. high x 2¾ in. wide and weighs 14¼ lb. They are constructed throughout of stainless steel.

Traps have proved highly successful for condensate drainage on heat exchangers and stage heaters, reheaters, stills and evaporators. Basic operating principle is as follows:

Trap employs a hinged lever and two valves mounted on a valve seat plate. Control flow which governs opening and closing action of valves is obtained by allowing small clearances between inlet and outlet valves and their respective seats when lever is at rest.—*Yarnall-Waring Co., Philadelphia* 18.

Circle 109A on Reader Service Card

Sealed Bearings Mark Belt Conveyor Idler



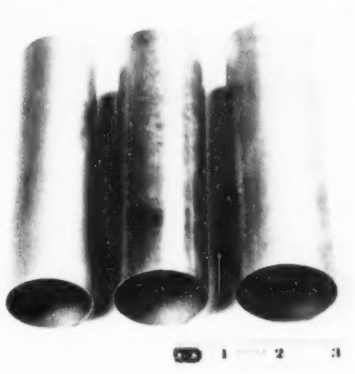
Savings in grease, labor and belting are reported with use of new type belt conveyor idler.

Designated Type "UST", idler employs prelubricated, sealed units incorporating Timken bearings and Garlock Klozures. Assemblies provide an ample grease reservoir which effects savings and further eliminates possible migration of grease from upper to lower bearings on inclined rolls. Lubricant used is a water-repellent grease of stable consistency with a wide temperature range for long life.

Sealed bearing assemblies prolong belt life by prevention of grease migration through seals onto belts. Idler is so constructed that it can be simply disassembled, cleaned, re-lubricated and reassembled for another extended period of time.—*Industrial Div., Continental Gin Co., Birmingham 2, Ala.*

Circle 109B on Reader Service Card

Seamless Light Tubing Made in Larger Sizes



More applications of seamless light-wall tubing are anticipated with availability of larger diameter tubes. Maximum O. D. has been upped from 1½ to 2⅛ in.

Large diameter tubing is furnished in three stainless analyses—AISI Types 304, 321, and 347—and in Monel metal. Tubing is produced with pickled or standard bright finish and in three tempers: No. 1 fully annealed; No. 2 half-hard drawn and, No. 3 full-hard drawn. Tubes range from 5 to 22 ft. in random, multiple or cut lengths.

Standard O. D. tolerances are .005 to .000 on tubing up to 1½ in. and .010 to .000 on tubing 1½ to 2⅛ in. Wall thickness tolerance is .010 on all sizes.—*Superior Tube Co., 1582 Germantown Ave., Norristown, Pa.*

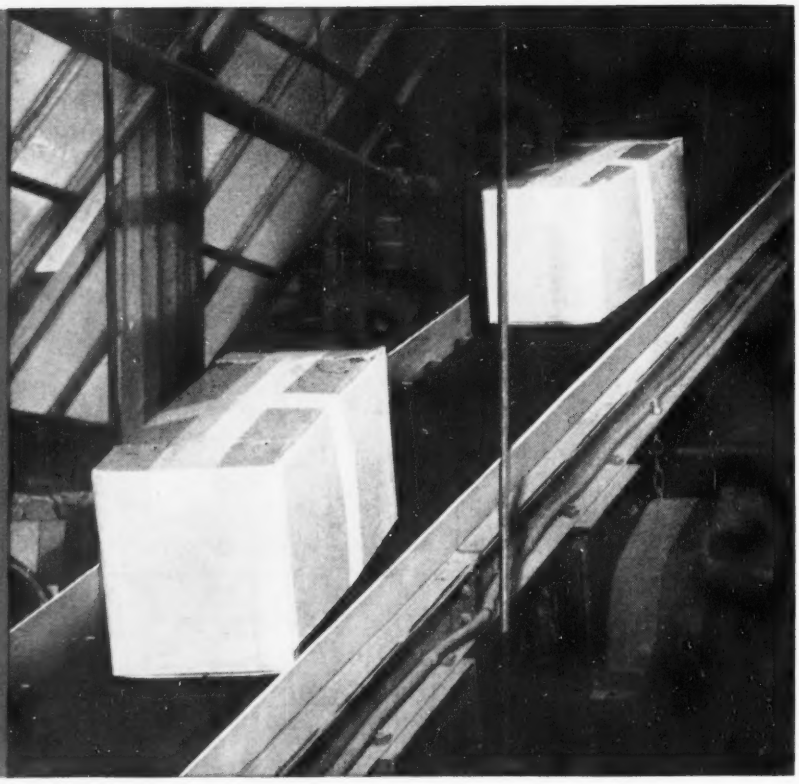
Circle 109C on Reader Service Card

"Package-Type" Conveyors Available on Lease

Adoption of new rental plan makes gravity and belt conveyors available to processors on a lease basis. Thus, "Package-type" conveyors can be installed and used by firms without necessitating a major capital investment.

Under the plan, conveying equipment is installed by manufacturer for a mutually agreed-on charge. Fixed monthly sum covers use of equipment.

On their way!... smoothly and profitably



Thermoid Conveyor Belts cut materials handling costs

Thermoid Industrial Rubber Products — Quality Service

Thermoid Conveyor Belts provide top performance regardless of operating conditions—oil, grease, severe flexing, shock loads, high abrasion or extreme heat.

In the warehouse or on the production line, Thermoid Conveyor Belts handle materials of all kinds more efficiently and economically . . . give that extra margin of endurance that reduces maintenance and replacement costs . . . pays off in longer wear.

Write for a copy of the Thermoid Conveyor Belting Catalog No. 3679, or call your Thermoid distributor. He is prepared to suggest the best conveyor belt for your requirements.

When you have an unusual materials handling problem, a Thermoid Sales Engineer is always ready to help.

It will pay you to specify Thermoid.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

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Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

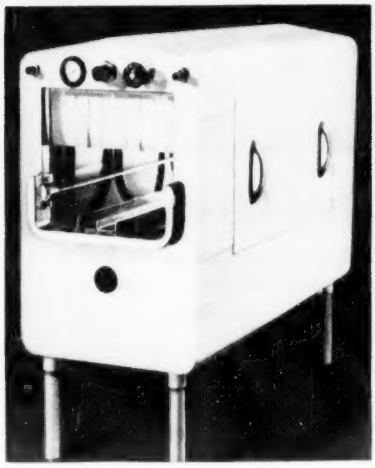
while insurance, maintenance, repair and personal property tax are paid by the conveyor manufacturer.

Leases under the agreement are set up for a ten year period. Monthly rental is reduced after each 3-year period equipment is in use following installation.

New plan permits firms to fix handling costs, provides hedge against rising equipment prices, and insures uninterrupted service through use of factory trained maintenance men provided by the conveyor company.—*Rapids-Standard Co., Inc., 507 Plymouth Road, N. E., Grand Rapids, Mich.*

Circle 109D on Reader Service Card

Compact Washer Cleans Five Cases Per Min.



New, compact unit is designed to thoroughly clean cases, crates or boxes at rate of one every 12 sec.

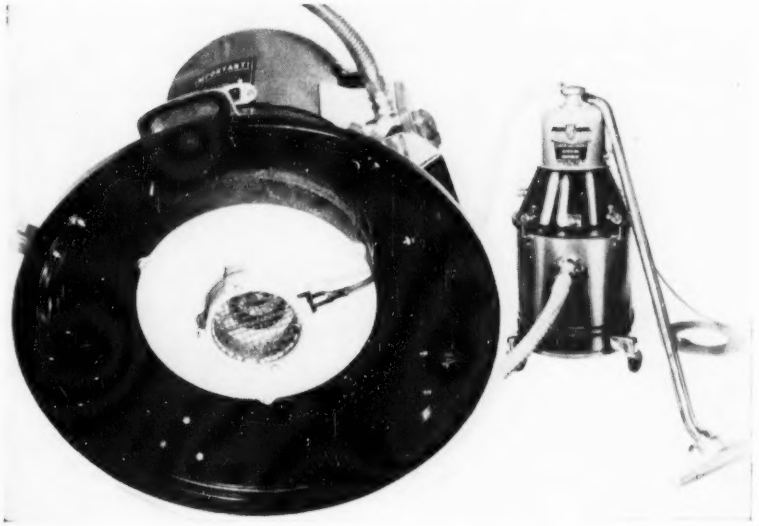
Called the "5 x 5" Case Washer, it is 5 ft. long, 2 ft. wide and has adjustable pipe legs which help adapt it to any roller or power conveyor line. Headers for wash and rinse jets completely encircle cases so that all parts receive a triple alkali wash plus fresh water rinse. Cleaning solution under pump pressure cuts off dirt.

To facilitate cleaning the unit, it has removable side covers, full-size double strainers, brass nozzles and header plugs. Wash tank has steam heater, dial thermometer and float valve for make-up. Tank can be drained to prevent freezing.

Wash pump can be installed on either side or end of washer to suit space availability. — *Cherry-Burrell Corp., 427 Randolph St., Chicago 6.*

Circle 111A on Reader Service Card

Device Protects Motors Against Flooding



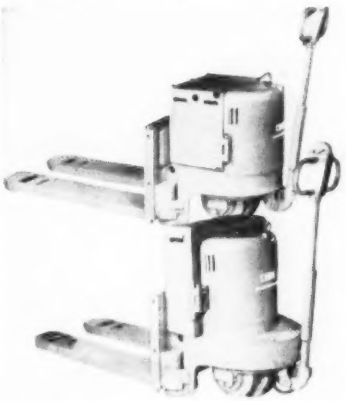
Industrial vacuum cleaner motors are claimed to be fully protected against flooding troubles by recently developed device known as an electronic motor shutoff.

According to maker, flooded electric motors have long been a source of trouble since users frequently overload vacuum tanks. Result is that water or other liquids are drawn up into motor turbines and bearings.

Electronic shutoff is an independent wiring system including two electrodes mounted parallel at base of turbine. It is claimed that as little as one drop of water crossing these electrodes will cause them to break the circuit, shutting off the motor. And here's double protection—the motor cannot be started again until electrodes have been dried, vac tank emptied, filter drained, and motor switch turned off and back on.—*Multi-Clean Products, Inc., 2277 Ford Parkway, St. Paul 1.*

Circle 111B on Reader Service Card

Battery-Powered Trucks Come in Two Versions



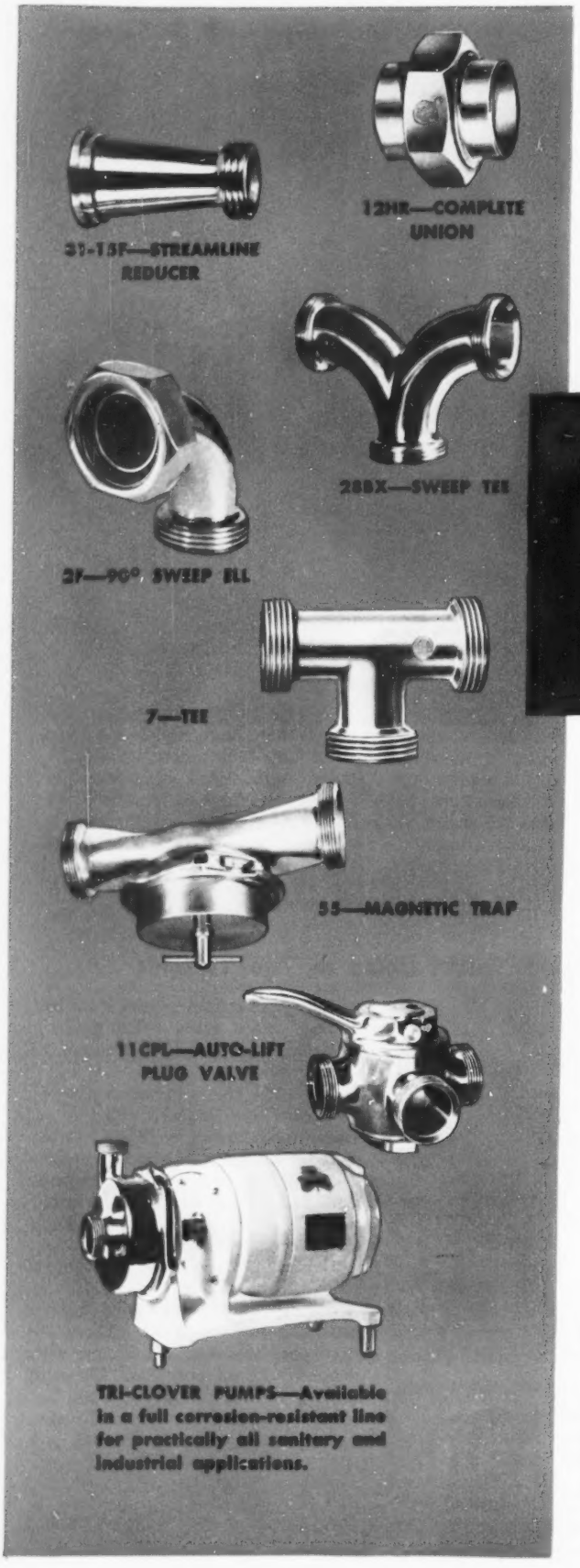
"Motor-in wheel" drive, cast-steel frame construction, and short over-all length are features reported for 1953 Powrworker hand truck line. New model is a pallet-type, electric-powered mover with a capacity up to 6,000 lb.

Drive motor, specially developed for unit, is mounted inside 14-in. drive wheel, which rotates around it on ball bearings. Gear train, operating in a bath of oil, is sealed from motor in separate housing.

New truck comes in two versions—a "walk-it" or "ride-it." One is arranged for a single t ay (1 x 6) layout of battery, while other accommodates a double tray (2 x 3) battery layout. Each truck travels at 3½ mph. without load, 2½ mph. with full load. Each has a 4 in. vertical lift.

Control box and tubular bayonet-type control handle is a welded assembly mounted to steering handle providing easy operation. There are two speeds forward and reverse with defined notched positions. Fingertip walking-beam built into control box selects speed and direction and makes it impossible to apply forward and reverse power simultaneously. Contactors are interlocked with time delay in first speed providing smooth, safe acceleration.

Control handle is spring-loaded so



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. . . available from STOCK

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Available in a complete line of types and sizes, from 1 in. through 4 in., Tri-Clover Sanitary Fittings represent the very highest quality. Precision fabrication methods and workmanship responsible for this quality are both costly and time-consuming . . . but the excellent, long-term service obtained in actual installations prove beyond doubt these methods are well worth while.

Tri-Clover Sanitary Fittings, Valves, Pumps, Tubing and Specialties are available from stocks carried by leading jobbers all over the country.

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FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

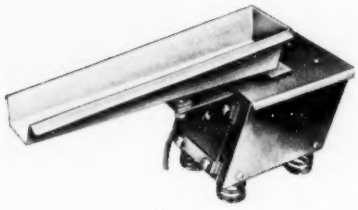
S153

For more information, use coupon on page 157.

that it will return to vertical position when released and automatically cut off power and apply brakes. Walking beam switch is also spring-loaded to return to neutral if control handle is held in drive position.—*Powrworker Lift Truck Dept., Clark Equipment Co., Buchanan, Mich.*

Circle 111C on Reader Service Card

Moves Bulk Material At 500 Lb. Per Hr.



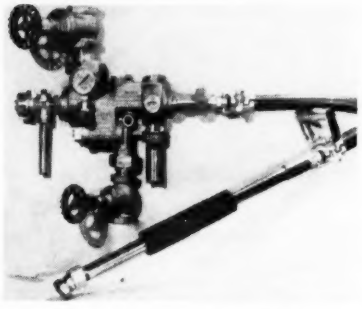
Small vibratory feeder, Model F-00, is capable of moving up to 500 lb. of bulk material per hr. to various types of processing equipment, according to reports.

Model utilizes electromagnetic principle. Unit, 7½ in. high approximately 14 in. long, and weighing 14 lb., is compact making it suitable for incorporation into weighing and packaging machines and other types of processing machinery.

Rate of flow of material from feeder is regulated by rheostat in separate controller.—*Synthron Co., Homer City, Pa.*

Circle 113A on Reader Service Card

Jet Cleaner Operates On Low-Pres. Steam



New unit now makes available to plants with low pressure steam facilities, advantages of hydraulic jet cleaning methods.

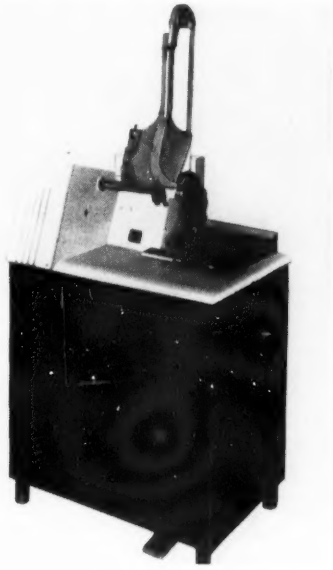
Called Booster Jet, it operates on cold water and plant steam, 5 to 25 psi. Unit is capable of converting 5 psi. inlet steam pressure to 100 psi. at discharge. Increase ranges proportionately to 200 psi. discharge pressure resulting from 25 psi. inlet steam.

Jet will accomplish thorough clean-up in minimum time. Solid stream of hot water, containing detergent up to 25 percent of total volume, with temperatures of 160 to 210 deg. F. under pressure of 100 to 200 psi. is propelled with controlled force. Resultant impact removes dirt, grease and stubborn matter from walls, floors and equipment.

Length of jet is manually controlled to extend as far as 30 ft. from discharge nozzle. Unit is capable of removing soil from inaccessible machinery parts, thereby eliminating waste, time and labor spent on dismantling equipment for cleaning.—*Sellers Injector Corp., 1600 Hamilton St., Philadelphia, Pa.*

Circle 113B on Reader Service Card

New Packaging Machine Feeds Clips by Gravity



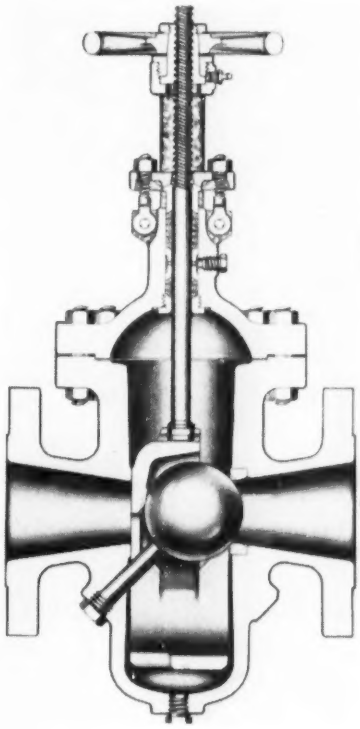
On new Cryovac HT packaging machine, clips are fed into clamping head by gravity instead of automatic system used on earlier models.

Known as the HT-E machine, unit does same job of vacuumizing, twisting and sealing plastic bags containing meats, fish, poultry and other products as its predecessor according to maker. Its clip feeding system operates as follows:

At a pull on a strip of paper tape, aluminum clips are pulled upwards out of magazine behind machine and into gravity chute. When chute is filled, machine is ready for operation. When empty, operator tugs on paper tape and new supply fills chute, automatically feeding clips snugly into clamping head. At touch on foot pedal, head strikes forward and clamps twisted neck of bag with clip, providing a vacuum seal.—*Dewey & Almy Chemical Co., Cambridge 40, Mass.*

Circle 113C on Reader Service Card

Ball-in-Cage Functions As Closure in Valve



New line of valves operates on unique principle of closure by employing a ball in place of disk. This ball is not attached directly to stem, but rides in cage attached to stem by a tee-head slotted construction.

In operation, ball is moved to and from center of flow and rolls into and out of body seat. Ball disk is mechanically locked in closed position by a wedging member on cage. In moving to fully open position, ball rolls out of seat and up, until lined up vertically with stem and is carried out of path of flow.

Design provides accurate flow control with minimum of wire-drawing; straight-through flow with low pressure drop; tight shut-off; easy operation; and complete freedom from vibration or chattering.

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For your next plant managers conference!

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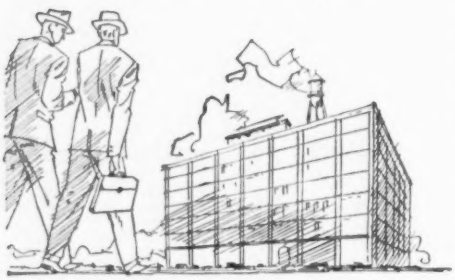

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Take advantage of General Electric experience in industrial radio communication! Call our local office today or write: *General Electric Company, Section 7033, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

G-E RADIO GIVES INSTANT CONTACT— *AVERTS DISASTER!*

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It will pay you to investigate G-E 2-way radio. Famous for outstanding performance . . . rugged construction . . . and exceptionally low maintenance requirements . . . General Electric experience in the industrial communication field gives you that built-in quality that assures satisfaction!

GENERAL ELECTRIC

Valves are available in venturi patterns, with flanged ends, in cast carbon steel and 18-8 Mo. alloy steel, and in a wide range of sizes beginning at 1-in. Cast steel valves are available in 150, 300, and 600 lb. classes, and alloy valves in 150 and 300 lb. classes.—*Crane Co., 836 S. Michigan Ave., Chicago 5.*

Circle 113D on Reader Service Card

New Chemicals

Hand Cleaner Employs Soft, Mild Abrasive

Termed ideal for use by female employees and others desiring a material with a soft, mild abrasive is a new product called Cob Hand Cleaner.

Material is lightweight free-flowing powder containing corn cob meal as abrasive. Cleaner contains Lanolin and toilet grade soap used is of mild (pH 7.5) alkalinity. It produces a good lather and rinses readily. Unlike many vegetable type cleaners, material is stated not to rot, ferment, attract vermin or clog drains.

Cleaner is available in bulk only, in 185 and 90 lb. drums.—*Magnus Chemical Co., Inc., Garwood, N. J.*

Circle 115A on Reader Service Card

Round-Flaring Can Uses Plastic Liner

Advantages for packer, retailer and housewife are cited with use of new container—a sauerkraut packaging innovation.

It is a 50 lb., round flaring can with a slip cover, which can be lined with a polyethylene bag.

For filling, top of plastic bag is folded neatly out over lip of can. After filling, bag is closed securely with a rubber band, and slip lid put on.

Container replaces old, larger kraut barrels. Frequent replacement of smaller container and rubber band reclosure of plastic bag assure consumer of fresh kraut. Use of can eliminates handling of returns and cooperage credit slips. Further, durability of cans exceed barrels and are thus less expensive. Bag-filled can is neat and attractive and can be displayed prominently and not hidden from view.—*Continental Can Co., Inc., 100 E. 42nd St., New York 17.*

Circle 115B on Reader Service Card

Window Tint Coat Is Easy to Apply

Increased visual comfort in the plant and office is reported with use of new coating for windows and skylights.

Called Glare-Out, it is termed a transparent blue-green tint material that is easy to apply. It can be sprayed or rolled on windows or skylights to cut down heat and glare from the sun, thereby improving working conditions and increasing productivity.

It covers up to 400 sq. ft. per gal. and can be put on with a spray gun or mohair paint roller. Use of roller creates a mottled effect. It is reported not to peel, chip or wash off, so that tinted windows may be safely washed in the ordinary way.—*Fade-Proof Corp. of America, 3520 N. Spaulding Ave., Chicago 18.*

Circle 115C on Reader Service Card

New Silicon Surfacer Used on Masonry

Staining and efflorescence of exterior and interior masonry surfaces is reported prevented with use of a new silicon type water repellent.

Material, called Silicon Mason-Shield, is stated to overcome problems encountered with concrete, cast stone, Indiana limestone, clay brick, unglazed tile and all types of mortar joints. Silicon penetrates deeply into masonry surfaces to act as a water repellent. It is stated to be unaffected by any oxidation process.—*The Wilbur & Williams Co., 130 Lincoln St., Boston 35.*

Circle 115D on Reader Service Card

Neoprene Coated Booties Minimize Slips, Falls

Many advantages in wet floor operations are cited with use of new 10-in. booties. Boot sole has tiny suction cups that grip wet floors like a plunger.

Entire boot is heavily Neoprene coated to resist corrosive action of fats and oils. Steel safety toe box is tested to withstand impacts in excess of one ton. Wide top allows room to stuff pants legs inside.—*Lehigh Safety Shoe Co., Allentown, Pa.*

Circle 115E on Reader Service Card

OTHER DEPARTMENTS
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In Behalf of Progress . . .

Diagnosing Cold Death for Microorganisms in Food

Nothing so stirs the imagination as the intriguing possibilities of ionizing radiation. Yes, cold killing of microorganisms offers tremendous apparent advantages. Not only are most foods adversely affected by heat, but many which can't withstand Btu.'s might be taken out of the perishable category by cold treatment—bananas, for instance.

Then we have quantities of radioactive waste which off-hand would seem to provide a cheap source of radiation for sterilizing foods.

But let us look beyond the surface of cold sterilization. When we do, we see that the potentialities of the technique are exceeded only by its complexities. Many problems are yet to be solved before the method becomes commercially feasible—and cost is not the least of them.

We recently had the privilege of hearing many "angles" of the problems discussed at an interesting and constructive symposium at Polytechnic Institute of Brooklyn—by leading authorities. While much of the information presented is of interest only to researchers, fundamental factors brought out in the session are of importance to all food manufacturers. These are:

1. There is no doubt that the radiation will kill bacteria, yeasts, molds, enzymes, and parasites.

2. Undesirable side reactions often occur, these varying with each product. Milk, for example, is thrown off flavor. But ways to minimize these reactions are being found, such as removal of oxygen and use of "protective" substances.

3. More research must be done on specific applications, and more importantly, on basic factors. For example, we need to know more about the effects of ionizing radiation on various molecular structures and on basic materials such as carbohydrates, proteins, and fats.

4. Use of waste fissionable materials is not as promising as it appears to be. This waste must be expensively processed to purify and concentrate it. It must be specially packaged for transportation. And costly equipment must be designed and constructed to use it. There is a difference of opinion as to the ultimate use and cost of the waste, but commercial application is a very long way off.

5. At present, electron accelerators—Van de Graaff, Capacitron, and resonant transformer—look like the least expensive and most practical sources of the radiation. Overall costs, including amortization, are placed at a fraction of a cent per pound of product.

6. First commercial application of cold sterilization likely will come in the pharmaceutical industry—where heat can't be used and product value is high. It also may find a paying application as a chemical—as in polymerization.

Sterilizing food looks like number three among its conquests, and then for special and limited uses. Some think it feasible for killing trichinae in pork, only mild dosage being required. Or the penetrating gamma radiation might be used to sterilize rolls of waxed paper wrapper for bread.

7. Experts agree that you shouldn't try to do it with radiation if it can be done with heat.

All of which leads to this practical conclusion for food manufacturers: Don't delay any modernization plans while waiting for ionizing radiation. Just let your research department play with this new tool while you install advanced heat-sterilizing methods.

But tell those research boys to keep a clear eye on the new tool.

Progress in Nutrition—More Needed, More Coming

We have come a long way nutritionally in little more than a decade. Pronounced vitamin and nutritional deficiencies are rare today among the adult population of the United States. That is the observation of Dr. Russell M. Wilder, who heads the Food & Nutrition Board of National Research Council. And this contrasts strikingly with the prewar situation.

Food manufacturers can take a bow for their contribution to this great achievement. But Dr. Wilder points to substantial evidence that a large segment of our population are skating on thin ice nutritionally. They have little residual to protect them during illness or in periods of unbalanced or short diets.

It comes as good news, then, that current developments point to enhanced nutritive values of processed food. One of these is short-time high-temperature processing of canned foods—the quick, high heat doing less damage to some vitamins and at the same time retaining a more natural flavor, color, and texture. Another is vitamin C enrichment of whole and dried milk and vitamin standardization of juices.

So another decade will perhaps take nearly everyone off thin nutritional ice. If health is wealth, we are rich—and will be richer.

USERS FIND IT HARD TO BEAT this Aluminum Drum for

CLEANLINESS

PFAELZER BROTHERS, *Chicago*, are enthusiastic users of Wear-Ever Aluminum Drums. They've found that the smooth, seamless surfaces of these drums, their rounded corners and the continuous welds that close open seams, assure a high degree of sanitation. They've also found these drums light, in spite of the thick metal and hard alloy used—therefore easy for employees to handle.

DURABILITY

TOBIN PACKING COMPANY, *Albany, N.Y. Division*, selected Wear-Ever Aluminum Drums after making careful comparison tests. The extra hard, extra thick alloy used in these drums enables them to stand up under rough daily handling, cuts replacement costs. The drums won't absorb and pass along odors, cannot impart any odor of their own. And because aluminum is a good conductor of heat, these drums quickly cool their contents when placed in a refrigerator or in cool air.

WEAR-EVER Aluminum

Standard of Quality for more than 50 years

WEAR-EVER ALUMINUM TRADE MARK REG. U.S. PAT. OFF.

The Aluminum Cooking Utensil Company, Inc.
303 Wear-Ever Bldg., New Kensington, Pa.

☐ Send me detailed information on your line of drums.

☐ Send me catalog of your complete line of food-plant equipment.

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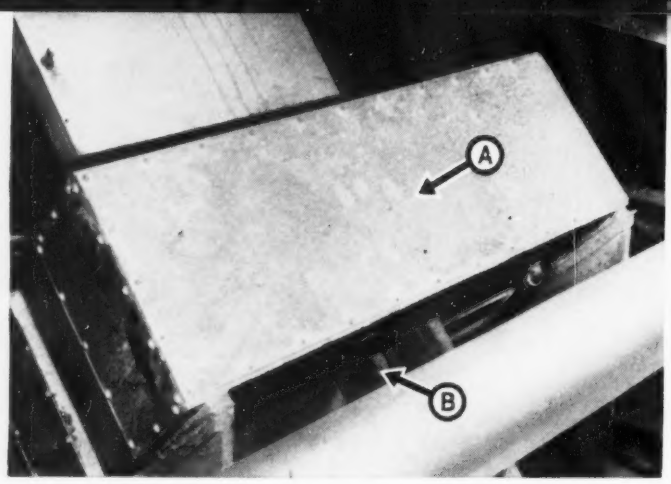
Cut out, clip to your letterhead and mail today

TURN PAGE FOR FOLDOUT FLOWSHEET →

1 **DUMP TRUCK,** with an acid-resisting stainless body, carries peel to mill.



2 **ELECTRONIC** detector (A) spots tramp metal in peel chute (B) and energizes drop-out gate. Metal removal protects grinders.

Advanced Citrus-Peel Process

Layout of Highly Engineered Line That Ups Quality by Flash Drying

A LIGHT, almost natural color characterizes the high-grade feed that Minute Maid Corp. makes from citrus waste at its new Plymouth, Fla., mill. Further, there are no black specks marring the product.

The use of flash dryers is credited in this improved operation, which proceeds as follows:

Peel (and rag and seeds), discharged from the juicing plant, is delivered in dump trucks to the feed-mill receiving bin—point (1) in accompanying flowsheet. The trucks have stainless steel bodies to withstand the corrosive acids.

THE ENGINEERING THAT SHAPED THIS LINE and the working principles coordinating it are spotlighted in this month's feature, "Integrate Complex Operation"—p. 84.

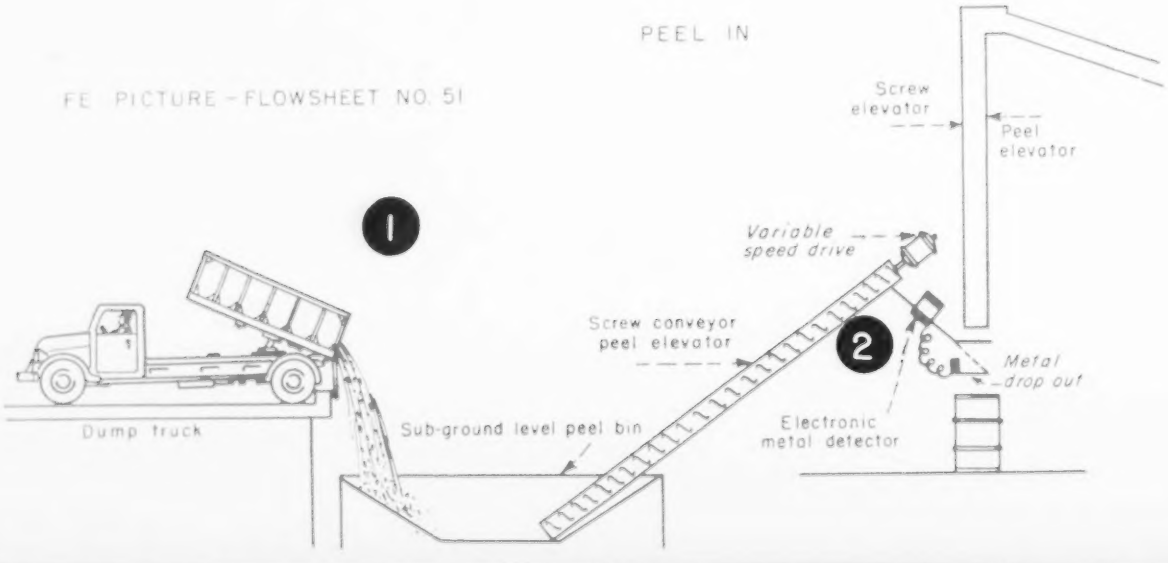
A variable-speed, heavy duty screw conveyor elevates this waste to a chute leading through the field of an electronic metal detector (2). Presence of any tramp metal in the flow opens a trap door at base of chute. At this stage, too, chemical agent is introduced when needed to condition the material.

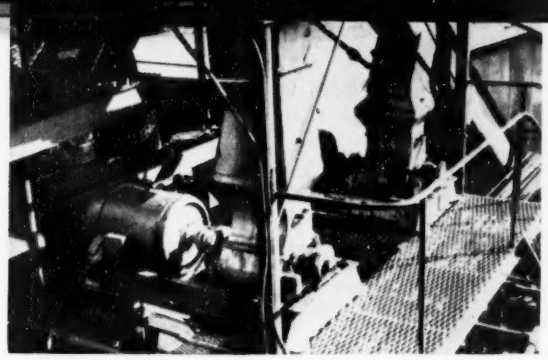
Metal-free material now goes to comminutors, which shred it into $\frac{1}{4}$ to $\frac{3}{8}$ in. particles. This mass drops into a delay screw, where it is mixed for several minutes with press water, then recycled for conditioning. From here, is fed to continuous, steam-heated hydraulic presses.

Press cake (67 percent moisture content) is immediately sent to the dryers. The press water (containing about 6 to 7 percent dissolved sugars) is divided into two streams. The first is recycled back to the delay screw for use in the previously mentioned conditioning. The second part is screened, pumped to storage, and eventually made into citrus molasses. Wet screenings from this second part are dumped back into the delay screw.

Two independent banks of air suspension dryers handle the solids. Feed to each dryer is regulated by a small section of a screw conveyor driven by a variable-speed motor. Just before entering the first dryer tower, press cake passes through a picker or fluffer (a short section of

FOOD ENGINEERING March 1953 Pages 118-121





3 **IN THESE** comminuters the peel is reduced to ¼-in. pieces in a once-through, split-second pass.

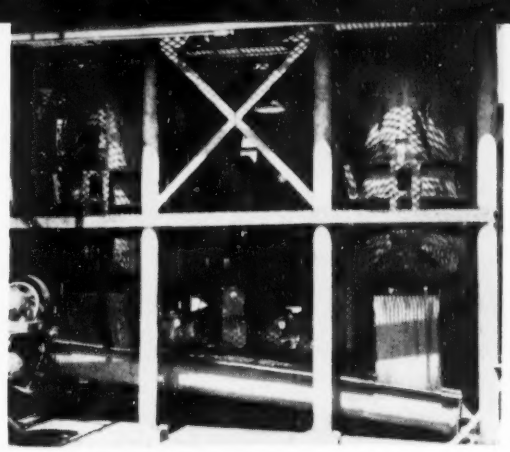
conveyor having two parallel, counter-rotating cut-flight screws). High-speed action tosses the cake, breaking it up for uniform drying.

"Fluffed" cake is drawn into the first-tower venturi by hot gases rising into the dryer from the main duct. This venturi ups velocities. Discharged into a cyclone in a swirling motion, the solids drop and are removed via an air lock at bottom of cone. Gases go to the atmosphere via a blower at the top.

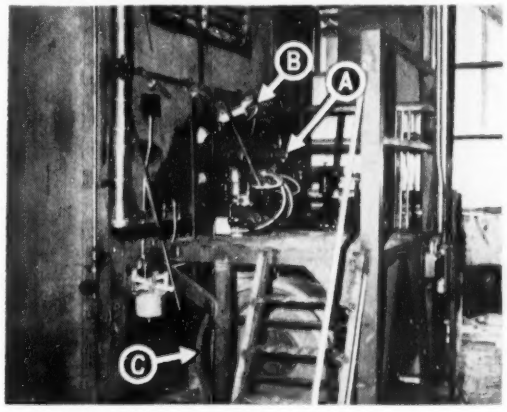
Material drops through the air lock into a conveyor feeding the second stage dryer, where the action described is repeated. It then goes to the third stage.

Dried feed, at a temperature of 130 deg. F, is discharged to the cooling conveyor, wherein its temperature is lowered below 100 deg. F. Cooled feed is screened on a multi-deck shaker. Large pieces that over flow from first screen slide down a chute and are bagged. This material is normally reprocessed.

The portion retained on the second screen (by far the most) is fed to automatic bagging machines and filled into 100-lb.-size jute bags. Smaller particles(those passing through both screens) are bagged as meal. Bagged product is stocked on pallets in the warehouse.

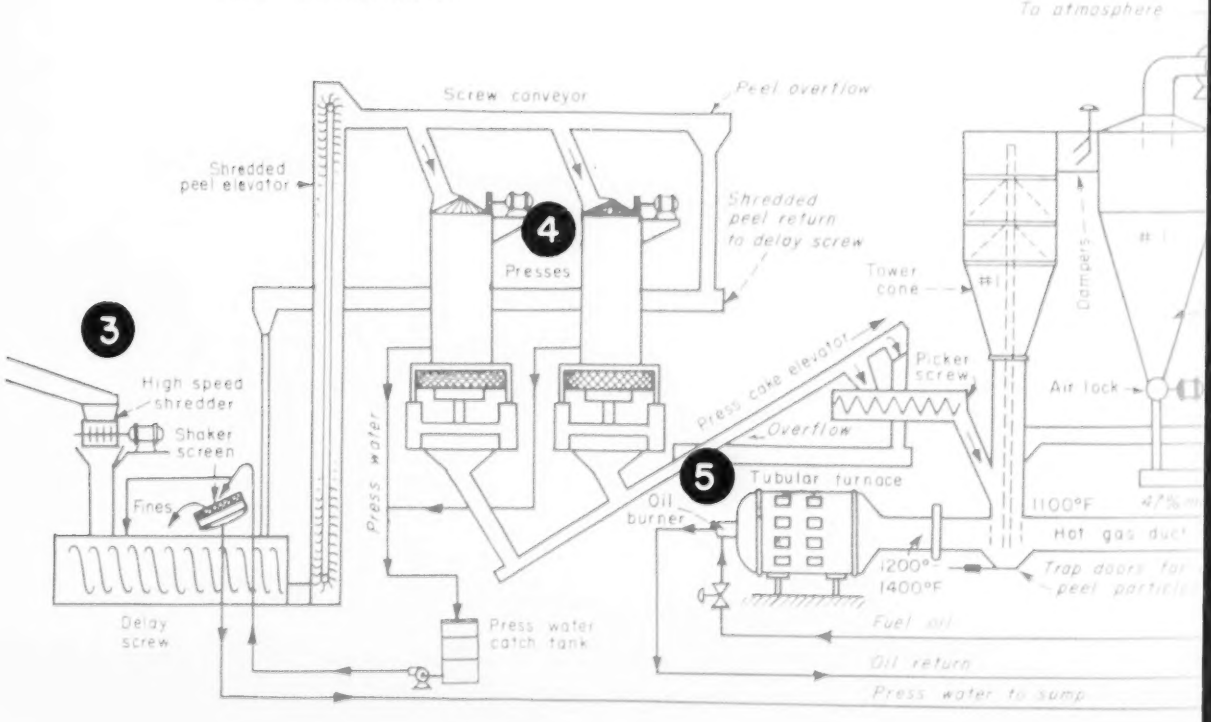


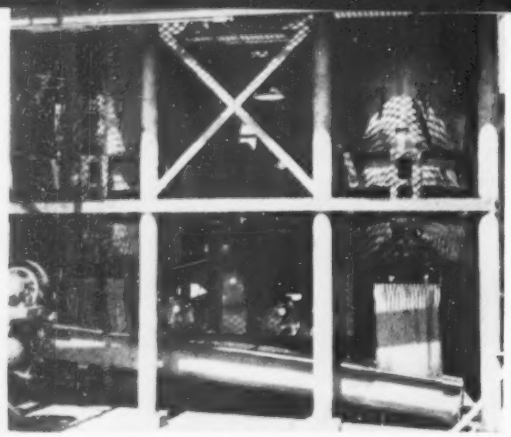
4 **HYDRAULIC** presses extract moisture as press water—source of citrus molasses.



5 **BURNER ELEMENTS:** Air-atomizing unit (A) photo-electric flame watchman (B); blower (C).

PEEL CONDITIONING





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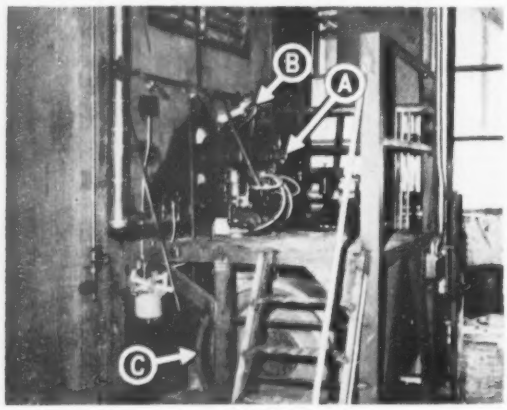

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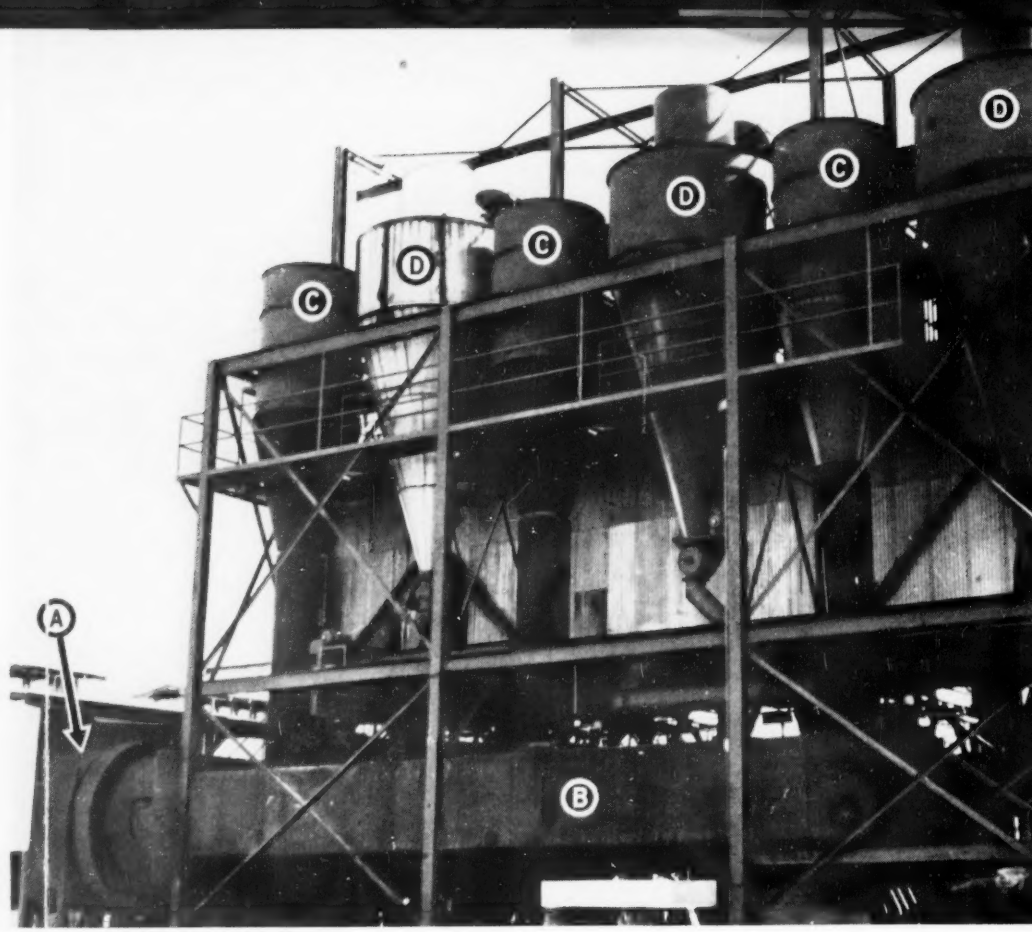
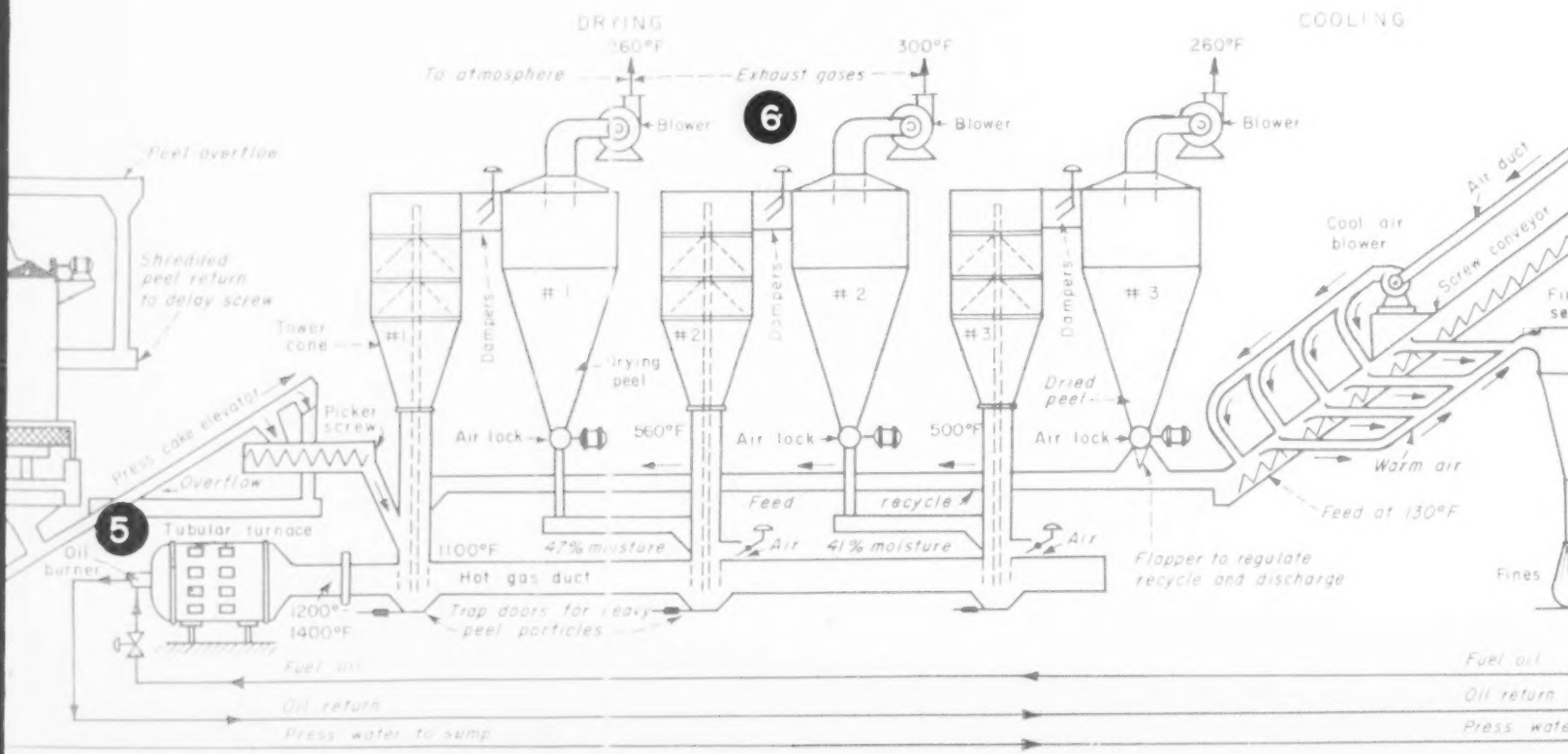
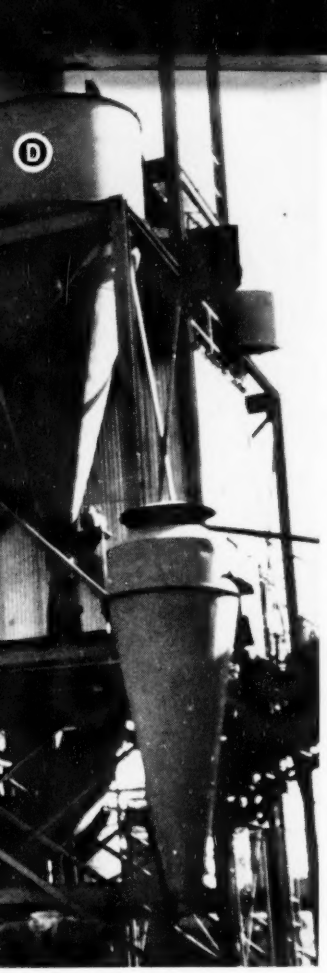


6 **THREE STAGE DRYER:** Hot gases from furnace (A) travel via main duct (B) to towers (C). Wet feed (near bases) and is separated in cyclones (D). Solids fall in cones, gases leave via blowers (top).

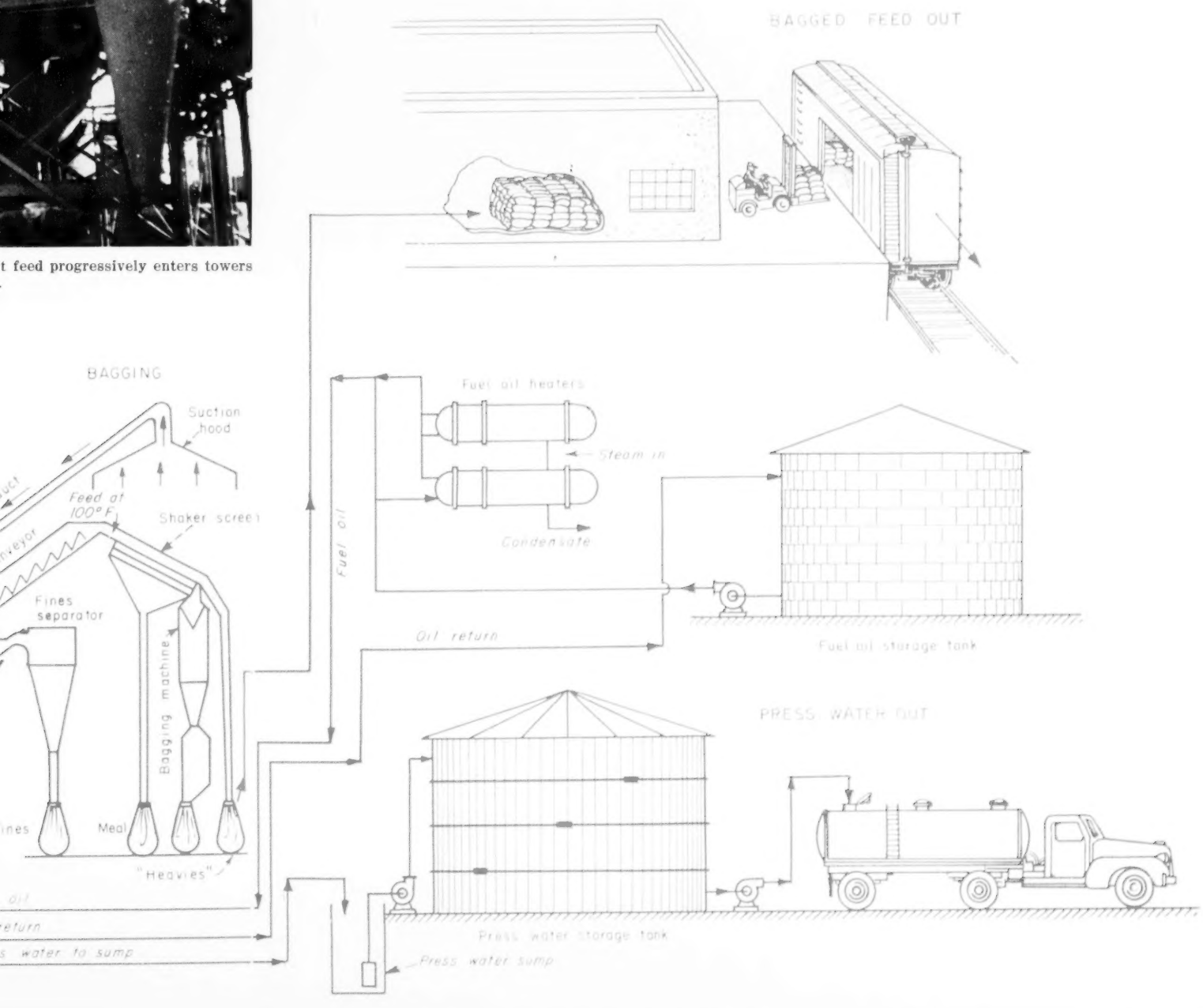




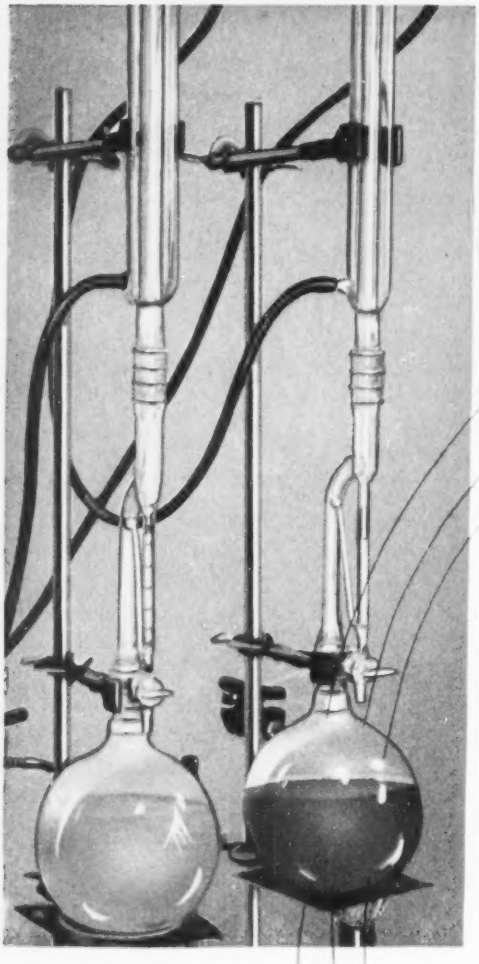
t feed progressively enters towers

LIST OF EQUIPMENT

Conveyors, Variable speed drives, Shaker screens—*Link Belt Co., Chicago*
Metal detector—*Radio Corp. of America, Camden, N. J.*
Presses—*Jackson & Church, Saginaw, Mich.*
Pumps—*Worthington Inc., Harrison, N. J.*
Chemical feeders—*B. F. Gump Co., Chicago*
Screen cloth—*W. S. Tyler Co., Cleveland*
Dryers, Cyclones, Dryer conveyors—*P. & L. Welding Machine Works, Anaheim, Calif.*
Blowers—*Heat Exchanger Service Co., Compton, Calif.*
Blower for cooling conveyor—*Chicago Blower Corp., Chicago*
Furnaces, Burners—*Williams Bros. & Miller, E. Chicago, Ind.*
Burner controls—*Wheelco Instruments Co., Chicago*
Dryer insulation (Wyolite and Foamglas)—*Respectively, Inland Fire Brick Co., Cleveland, and Pittsburgh Corning Co., Pittsburgh*
Dryer controls—*Minneapolis Honeywell, Brown Instrument Div., Philadelphia*
Scales—*Richardson Scale Co., Clifton, N. J.*
Bagging machines—*J. L. Ferguson Co., Joliet, Ill.*
Lift trucks—*Clark Equipment Co., Battle Creek, Mich.*
Electrical transformer—*R. E. Uptegraff Mfg. Co., Scottdale, Pa.*
Starters, Switchgear—*Cutler-Hammer Inc., Milwaukee*
Warehouse, prefab.—*Luria Engineering Corp., New York City*



The Taste of Sunshine—All the Time



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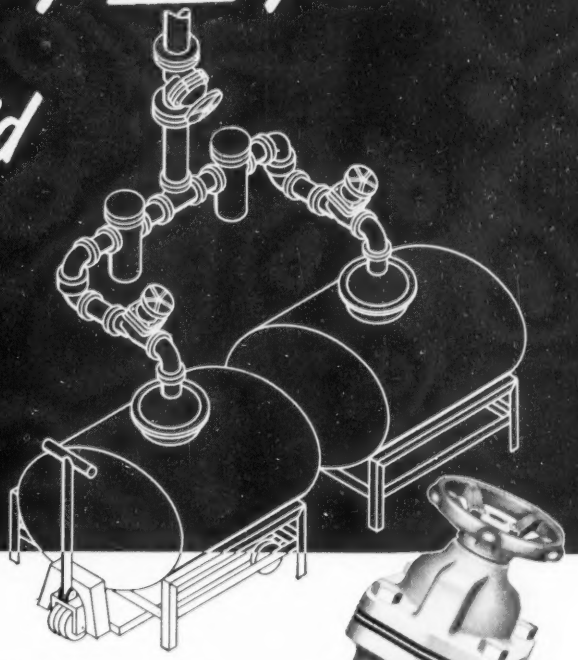
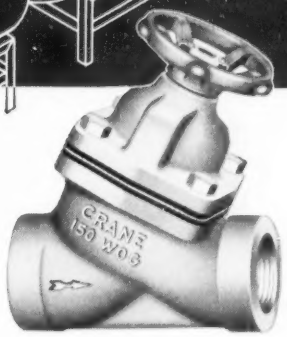
It's not what you Pay for Valves ...it's what they Cost you

on Sticky Fluid

for instance

(A Case History)





Crane Packless Diaphragm Valves, made with iron, brass, aluminum, or 18-8 Mo body, lined or unlined. See your Crane Catalog.

What you pay for valves is not the final criterion of value. Not when maintenance costs can quickly equal or exceed purchase price. And a valve that hinders production is no bargain at any price.

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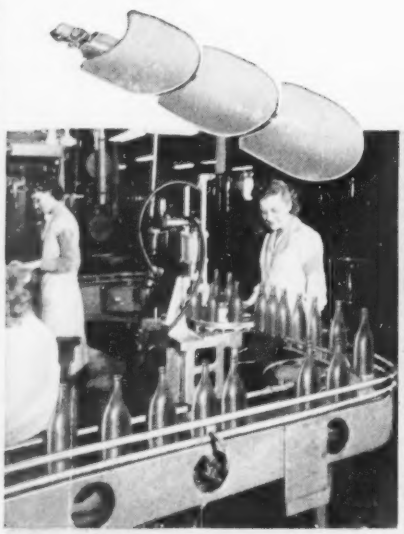

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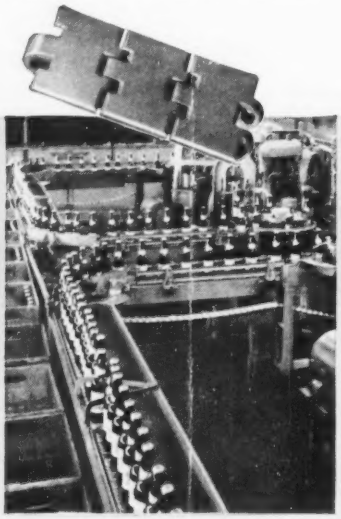
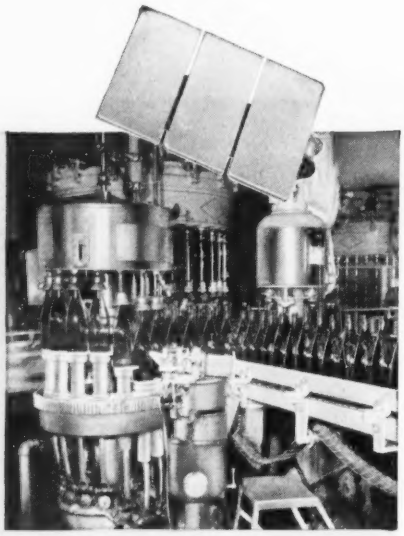


REX
TableTop®



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PlateTop

The new Rex FlexTop Chain is another outstanding addition to the Chain Belt line of bottle, can and jar conveying chains. With FlexTop added to famous Rex TableTop and Baldwin-Rex PlateTop, you can now choose the *one best* chain for every conveying application in your plant.

Where it is advantageous for the chain to weave around obstructions or make many sharp turns, or where the containers being carried are difficult to transfer, the new FlexTop is probably your most economical answer. Where extremely heavy loading is encountered or centers are unusually long, PlateTop may well be most suitable; while under "ordinary" conveying conditions, TableTop has often proved the best bet for dependable, low-cost service.

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PROSPERITY IN THE USA: How Deeply in Debt Are We?

How prosperous *are* the people of the United States? Previous messages in this special series have answered this question in part by recording the progress—relatively slow progress—we have made in increasing both the income and the wealth per person in the USA.

This fourth and concluding piece of the special series deals with the extent to which our prosperity should be discounted because it has been accompanied by an increasing volume of debt. Many correspondents have suggested to us that an individual or a nation can temporarily increase prosperity by borrowing, but in so doing lives on both borrowed goods and borrowed time. Our purpose here is solely to throw light on the question of whether or not we are now in that unenviable position.

On January 1, 1953, the total debt of the United States government and of its citizens was $627 billion, as shown in the table below. On its face, a debt of this magnitude, which represents about $3,900 of debt for each person, suggests that we are heavily debt-ridden.

TOTAL DEBT – PUBLIC AND PRIVATE

Federal government debt	$267 billion
State and local debt	30 "
Private debt	
Corporations	195 "
Individuals	135 "
	$627 billion

The burden of our debts, however, does not depend simply on their size. It depends in much more decisive degree on our capacity to carry the load successfully. This capacity, in turn, is partly a matter of attitude, and attitudes defy objective measurement. A community that gets very jittery about its debts has less capacity to carry its burden successfully than one that does not. But the accurate measurement of jitters, present or prospective, still remains to be mastered.

Capacity to Carry the Debt Load

Nonetheless, it is possible to throw some light on our capacity to carry the debt burden by studying key economic elements that can be measured with some degree of accuracy. The following paragraphs indicate how some of these key economic elements stand.

Compared with our national income, the total volume of our debts, public and private, is still well below the level of 1929, when it proved to be too big for the good of the country. Our total debt is now 113% greater than the national income whereas in 1929 it was 146% greater.

There are several other cheering facts about our debts. One is a sharp decline in interest rates which makes the cost of carrying our debts relatively much less than it was in 1929. It took 8% of our total national income to carry our debts in 1929; it takes only about 5% of the income today.

More Cheering Facts

We also have much more ready cash now than in 1929. Today individuals and corporations hold a total of $269 billion in cash or its equivalent which is almost twice as much as the portion of private short-term debt (about $140 billion) that is subject to sudden demand for payment.

Many students of the subject cite the relatively low cost of carrying our debts and the large volume of cash on hand, and reach the comfortable conclusion that our debt burden is nothing to worry about. In further support of this view they emphasize the fact that no important part of our debt is owed abroad. Hence, they reason there is not the danger, so conspicuous in Britain since the end of World War II, that our economy will be upset by the necessity of making heavy debt payments to other countries.

Some Dangers of Present Debt

However, the nature of our debts presents dangers that it would be foolish to ignore. This is true of both the debt of $267 billion owed by the federal government to its citizens and the $330 billion in private debts owed by some citizens and corporations to others.

Public debt can be a dangerous kind of debt because government has the power to print money or to create its equivalent by expanding bank credit. Of the $215 billion that the federal government borrowed during World War II, over $90 billion was borrowed from banks. This was the largest single contributor to the inflation of prices that since the war has robbed the dollar of about half of its purchasing power, and thereby robbed the buyers of government bonds of about half the purchasing power these bonds were supposed to represent.

If, as is quite possible, a new emergency should again require the federal government to borrow heavily while its debt remains so high, it is doubtful that the public would be avid to buy its bonds. Hence, the government might again be forced to resort to the inflationary process of relying on bank credit.

Private debts can be dangerous if the people take on new debts more rapidly than is justified by the growth of business or by their ability to repay. Last year bank loans were increased by the imposing sum of about $6½ billion, which represents an increase of about 11% in total loans outstanding. This is almost twice as much as the increase in the volume of business over the same period. Installment credit for consumers increased by $3 billion last year, again an increase in debt about twice as great as the increase in business volume in the fields where the credit was used. It is also the fastest rate of such growth in our history.

Constructive Use of Credit

So long as the expansion of credit does no more than keep pace with expansion in the volume of business, the expansion is constructive. Also, when credit is expanded to acquire resources and equipment that will enlarge the volume of business a little later, that use is clearly constructive. But when private credit expansion begins to run ahead of business growth, it is time for us to be heads up. Such credit expansion courts price inflation. It also creates a forced draft under business so that, if credit is cut off, there may be a painful drop.

To give a summary answer to the question: *Is the level of debt in the United States a danger to our prosperity?* — the answer seems to be, "Not at the moment." We owe nothing abroad. The interest burden on present debt is relatively small, and we appear to have the resources to handle the short-term debt. Yet both the total amount of debt and the recent rapid increase in total private debt, especially the latter, are enough to signal for caution. We need restraint on the part of business and consumers to avoid expanding private borrowing at an excessive rate. The federal debt needs to be reduced and put in more manageable form. If these things are done, we can proceed to build a sound prosperity.

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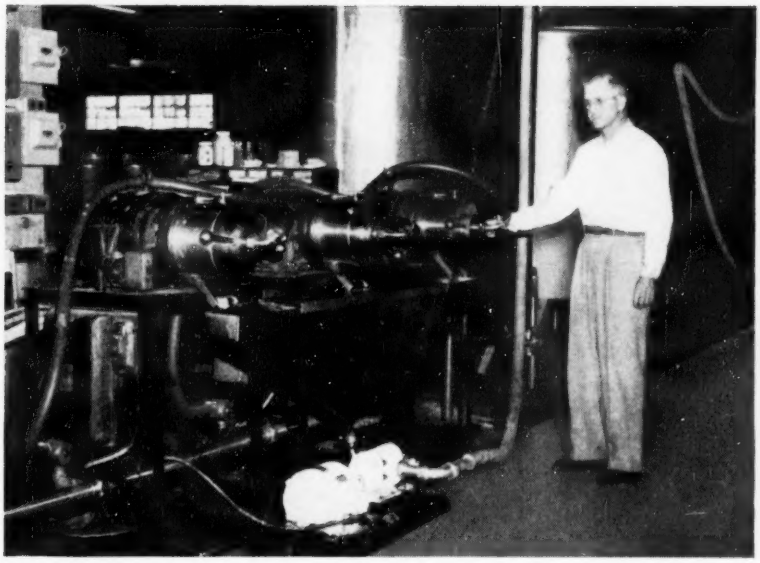
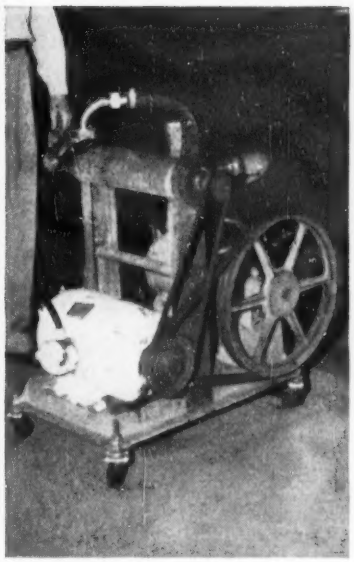


KEY UNITS in Morton's process for quality mustard are these Jayhawk fine-stone, continuous mills. Easy-off housing makes for fast cleaning.



FINISHING TOUCH to quality is applied in this continuous agitator.

Fine Milling—Fine Mustard

Agitator innovation tops-off efficient process. But heart of operation is high-speed stone mill

J. A. MORRIS
Plant Superintendent, Morton Foods, Dallas, Tex.

It takes fine, two-stage milling, double aging, special agitation, and stainless steel handling to make the quality mustards packed by young and progressive Morton Foods, Inc., Dallas, Tex.

Yet high production capacity is achieved in a small area of the company's new air-conditioned specialty products plant. First step is to blend ingredients in a 750 gal. tank equipped with a slow-speed, four-blade agitator. Then a continuous cracking mill delivers the batch into one of two 1,350-gal. mash tanks, Produced in 45 min., each tankful of mash is aged at least 24 hr.

After developing uniform flavor, the mustard is pulled by a pump through a continuous finishing mill, three mills being connected in parallel for high-production, fine-grind capacity—1,200 gal. in 9 hr. These mills discharge into a stainless steel V-shaped hopper with a bottom outlet connected to a rotary pump. Still not in the finished stage, the mustard is delivered through a hose and stainless steel pipe to 1,350-gal. finishing tanks for another 24- to 72-hr. aging.

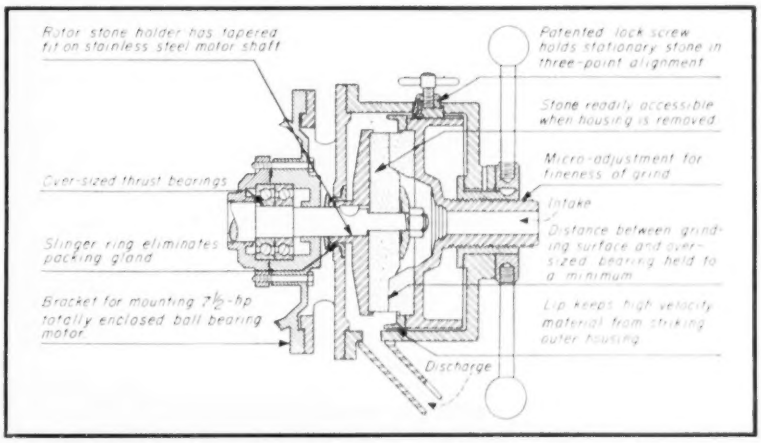
To this normal end-point in the operation, Morton Foods added a quality-enhancing touch of ingenuity. They developed a small, portable, continuous agitator to put a final polish on the smooth mustard mixture.

This agitator is nothing more than a horizontal cylinder, 18 in. long and of 3-in dia., with a V-belt-driven beater turning inside it. As the mustard is pumped from the finishing tanks, it passes into one end of the cylinder and out of the other, then on to the filling-machine hopper.

But the principal performers in this advanced mustard process line are the Jayhawk cracking and fine-grinding mills. These are fine-stone mills, each having a stationary stone and motor-driven, 3,450-rpm rotating stone between which the mustard passes.

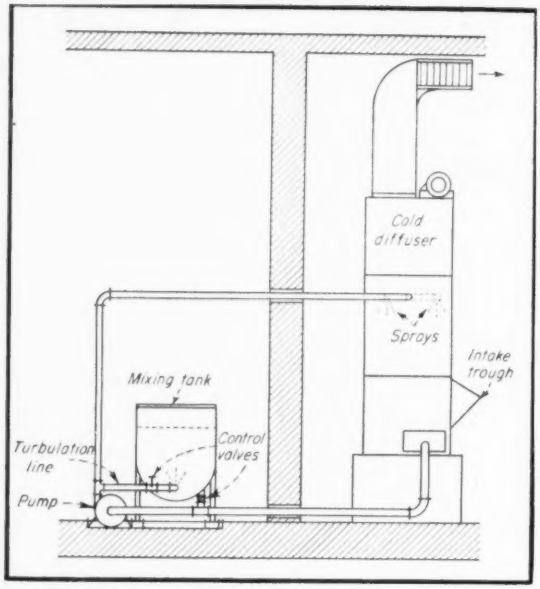
For the cracking operation, the stones are set for more clearance than in the subsequent fine milling. Equipped with a quick-off stainless steel housing, this type of mill is easily cleaned.

Morton makes a fine English-type table mustard and a sandwich mustard. A steadily growing Southwestern demand for these products is the company's proof of quality.


Rotor stone holder has tapered fit on stainless steel motor shaft
Patented lock screw holds stationary stone in three-point alignment
Stone readily accessible when housing is removed
Micro-adjustment for fineness of grind
Over-sized thrust bearings
Intake
Slinger ring eliminates packing gland
Distance between grinding surface and over-sized bearing held to a minimum
Bracket for mounting 7½-hp totally enclosed ball bearing motor
Lip keeps high velocity material from striking outer housing
Discharge

CROSS SECTION shows advanced features of fine-grind stone mill.

COLD DIFFUSER (left) uses dilute caustic solution to reduce carbon dioxide content of apple storage atmosphere, thus extending fruit's life without deterioration.



SCHEMATIC of new system. Caustic solution is prepared in mixing tank (left) then pumped to sprays in cold diffuser, where it meets air from storage room.

This Improved CO_2 Control

Cuts Apple Storage Costs

Substitution of dilute caustic for brine spray in cold diffuser makes unit do double duty. Eliminates barrel scrubbers, reduces consumption of caustic

FRANK KEDENBURG, JR.
Designer, Hudson Valley Engineering Co.
Port Ewen, N. Y.

Numerous savings result when cold diffusers, used to produce desired temperature and humidity in apple storage rooms, are simultaneously employed to control the carbon dioxide content of the room's atmosphere. Specifically—

- **Cost of owning, operating, and maintaining barrel scrubbers is eliminated.**
- **Consumption of caustic soda is reduced 75 percent.**
- **Caustic mixing operations are centralized outside the storage rooms.**

Deterioration in apples results from a process of respiration in which sugars are oxidized, releasing CO_2, water vapor, and heat. Rate of respiration determines the speed of deterioration. It can be controlled by reducing temperatures, decreasing available oxygen, and increasing the CO_2 surrounding the fruit.

Most favorable conditions for McIntosh apples, for example, are 2-3 percent O_2 and 5 percent CO_2, as compared with the standard atmospheric content of 21 percent O_2 and .03 percent CO_2. Temperatures should be maintained at 32 deg. F. during loading, and 38 deg. with 85 percent relative humidity during the holding period.

Under these conditions, apples can be kept for longer periods without such common disorders as brown core and core flush, and they can be removed with full assurance of prime eating quality.

In addition, apples so stored can be marketed for longer periods after they are removed to room temperatures.

Until recently, however, it was thought necessary to install extremely elaborate equipment to control both the temperature and the gaseous composition of the air in the sealed storage chambers.

Systems to provide these requirements usually include—in addition to the normal refrigerating and low temperature air conditioning apparatus to establish the necessary temperature and humidity—separate atmospheric washers to control the CO_2 content of the air. These are located immediately adjacent to each chamber.

As soon as the chamber is sealed and caulked, respiration of the apples begins, and oxygen content of the atmosphere starts to drop. When it reaches the desired level, it can be held there by admitting small quantities of outside air. (Oxygen content of storage atmosphere is checked twice daily with an Orsat tester.)

At the same time, CO_2 content of the atmosphere is increasing. In order to check it at the desired 5 percent level, air from the chamber is washed in a dilute solution of sodium hydroxide (caustic soda or lye). Used for this process are "barrel scrubbers" consisting of specially designed steel tanks with perforated baffles over which the caustic soda solution is sprayed. Each scrubber has its own blower mounted on top. Capacities are limited to 5,000 bu. of apples, and multiple scrubbers are needed for larger stor-

ages. In addition, relatively high quantities of caustic are used—approximately 4 lb. per 1,000 bu. per day.

In a recent discussion of the air-washing problem with Prof. R. M. Smock of Cornell University, the author concluded that a brine spray cold diffuser could be used to handle virtually the entire job. Our firm, a dealer for Carrier Corp. in the southeastern New York state apple country, had installed a number of forced air cooling units of this type to supply temperature and humidity to storage rooms.

Units are available in capacities far larger than the 5,000-bu. limit for the barrel scrubbers currently used. They are constructed of heavy gage sheet, hot-dip galvanized after fabrication for corrosion resistance. And each includes its own highly efficient blower section. It seemed logical that the spray system, through which brine was pumped over the cooling coils in the path of the air stream, could be used for both brine and caustic soda, thus adapting the unit to low temperature air conditioning and CO_2 control.

First such installation was made in the new 15,000-bu. room of Stanley Orchards, Modena, N. Y. Since that time, a number of successful installations have been completed, including that at Diorio's Storage, Milton, N. Y. (10,000 bu.); George Salpaugh's, Germantown, N. Y. (5,000 bu.); and a second Stanley Orchards installation (7,500 bu.).

The spray type diffuser has proved to be a natural for the combined job, because all the air in circulation within the sealed space is conditioned and washed continually. Amount of caustic soda consumed has worked out to 1 lb. per 1,000 bu. per day, as against 4 lb. with scrubbers. With the more dilute solution there is less drying effect on the air. Also, humidity can easily be increased by substituting fresh water for caustic solution.

Design considerations have been worked out as follows: Amount of air in circulation should be approximately 1 cu. ft./min./bu. and not less than ¾ cfm. Solution in circulation varies with the size of the spray unit, and can be calculated on the basis of 5 gal./min./1,000 bu. apples. All mixing tanks are of 125-gal. capacity. Each tank can be used to serve storages from 5,000 to 25,000 bu. After pulldown or loading period, salt is left out of the solution, and only caustic is circulated.

The pump was selected on a basis of 10 gal./min./1,000 bu. Piping is arranged to supply 5 gal./min. to the tank turbulation line to prevent caustic or salt from dropping out of solution. Valves in the tank lines are used to control the flow of solution.

Dozen Debatable Changes Sought in Food Law

Additives, inspection, and fluoridation covered in bills. Many controversial factors pointed up

CHANGES by the dozen in the Food, Drug & Cosmetic Act are sought by various groups. Several bills to amend the Act already have been introduced. Others are in the offing.

Altogether these cover a wide variety and complexity of controversial topics of concern to food manufacturers.

Delaney on "Chemicals"

H. R. 2245 (Delaney) would provide for Food & Drug Administration control of chemical additives to foods—

"The term 'chemical additive' means any substance (including products resulting from changes in such substance after use) which:

1. "Is intended for use (A) as a food, or (B) to preserve or alter any food or any characteristic of any food, or (C) as a pesticide or for any other purpose in producing, processing, packing, transporting, wrapping, or holding food if such use is likely to result in the contamination of the food.

2. Is not generally recognized—among experts qualified by scientific training and experience to evaluate the safety of such substances—as having been adequately tested to show that it is not poisonous or deleterious, or is a poisonous or deleterious substance which is not generally recognized among such experts as having been adequately tested to show that it is safe for an intended use described in this paragraph."

Approval of the use of a chemical additive would be sought by filing an application with the Administrator of the Federal Security Agency. The request must include:

(1) "Reports of investigations which have been made to determine the acute and chronic toxicity and other potentiality for harm of the chemical additive.

2. "A statement of the composition of the chemical additive.

3. "A description of methods of analysis for the quantitative determination of the chemical additive in or on food, including animal or plant tissues if stored therein.

4. "Such samples of the chemical additive as the Administrator may require.

5. All directions, recommendations and suggestions proposed for the use of the chemical additive.

6. "If the chemical additive is a poisonous or deleterious substance: (A) a statement showing that the chemical additive is required in the production of food; (B) reports of investigations which have been made to show the quantities of the chemical additive, if any, remaining in or on the food; and (C) a description of adequate methods of removal of excessive quantities of the chemical additive remaining in or on the food."

Approval of the application is automatic if no action is taken by the Administrator within 60 days of filing. Prior to that date, however, the Administrator may issue an aproving order, issue a notice of a hearing, or may postpone the date of automatic approval to not more than 180 days from filing, if he needs more time to "conduct the necessary study and investigation" of the application.

Each applicant would have an opportunity for a hearing unless his request is approved without one. "As soon as practicable" after the hearing the Administrator must approve or deny the application.

The Administrator must take into account the extent to which the chemical additive is required "and the other ways in which the consumer may be affected by the same substance or other substances." Judicial review of the Administrator's orders would be provided in the U. S. Circuit Courts of Appeals by the existing section 701 (f) of the FD&C Act.

Miller Prepares Bill

Representative Miller (R., Neb.) is drafting a bill as a result of his participation in the Delaney Committee hearings.

The principal difference between this expected new Miller bill and the Delaney bill is that the "necessity for use" concept is deleted by Miller. Consumer safety is of primary importance, but economic decisions should not be made by legislation, in Representative Miller's opinion. He is also contemplating a similar bill for control of pesticide residues.

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controversial of the subjects. Many believe that mere notice to FDA of the plan to use a new chemical additive should be adequate unless official action is taken for a hearing before beginning use of the "new food." Others want actual approval by the FDA to be a prerequisite to initial distribution of such new food. Some even urge that an additive be "necessary" or be forbidden.

Interlocked with additive questions are the many uncertainties as to what constitutes adequate pretesting for public safety. Also involved is the question of who takes the responsibility for the testing—the chemical maker or the food manufacturer using the chemical. This question includes many aspects as to toxic dosage, cumulative factors, and the consequence of repeated or chronic consumption.

Residues in foods of "necessary" insecticides and other pest-control chemicals demand consideration separate from the deliberate additives. Equally important will be questions as to adequacy of testing. Ultimate control will unquestionably be based on the setting of "tolerances" for each pesticide. Not only the numerical value of tolerances but also procedure for their determination are important.

Responsibility for medical decisions is an important factor that may be developed as a consequence of both additive and residue subjects. Precedent establishes the principle that Public Health Service, the USDA unit governing registration of pesticides, and FDA consult each other for pertinent information before reaching a medical decision. Whether any new legislation need be included on this subject is questioned. Some industry groups would like to have FDA agree to use outside advisory committees regarding these medical matters; but law amendment making such advisory procedure compulsory seems unlikely.

Factory-Inspection Bill

Companion bills have been introduced in the House and Senate to restore FDA's factory inspection authority under the FD&C Act. The proposed amendent to Sec. 704 would eliminate the phrase "after first making request and obtaining permission of" the owner, operator, or custodian of the establishment, and inserting in lieu thereof the words "after first giving written notice to." These bills are H.R. 2769 (by Wolverton, R., N. J.), and S. 835 (by Smith, R., N. J.). Early action on the bills is indicated.

Factory inspection by representatives of FDA is the most wanted amendment by FSA Administrator Hobby and FDA Commissioner Crawford. Disputed are the conditions under which, if any, a food plant management may exclude the inspector. Some industry spokesmen ask that the scope of the inspection be specified and that a court order be required if the management protests. Little mentioned, but important, is the question as to confidence required for secret information which might become available to an inspector during such visit.

Bill Against Fluoridation

Water fluoridation would be forbidden if another bill were enacted. The bill is H.R. 2341 (by Wier, Farmer-Labor-Democrat, Minn.).

Adding of fluoride to city water supply results in fluorine additions to foods in many cases. This would become significant in food manufacture if it resulted in the concentration of substantial quantities of fluorine in food or beverages.

Other Changes Wanted

Speed-up of procedures by which standards of identity and other standards are reached is wanted by everyone. Some suggest that a legal requirement for more simple and "less legalistic" proceedings is desirable. Though important, this subject seems unlikely to be a major factor in law revision this year.

Better definition of the overlap and the gaps between BAI inspection at meat-packing plants and FDA authority over foods is wanted by some. Included in the controversy are questions as to what weight of food contents must be indicated on packages. Markings now relate to weight as packed under BAI supervision. Some want the weight as sold to customers substituted in line with FDA practice. Legislative consideration is possible, if negotiated agreements break down.

Regarding bread softeners, some industry spokesmen fear that law change may be necessary. Argument for new legislation is that unfair differentiation may now be made between mono- and di- compounds as compared with the polyesters.

FDA has gathered data by tests of its own, sometimes basing results and conclusions on samples supplied by cooperating manufacturers. Some demand that FDA be compelled to release data to cooperating companies as well as conclusions reached, if so obtained.

"Imitation", "Substandard", and the implications of minimum standards for identity are occasionally argued as important for legislative review. If general hearings on FDA legislation develop, these subjects will be spotlighted. Considerable uncertainty remains because of high-court decisions as to whether identity standards can be ignored by simple change in labeling to include the word "Imitation".

Similar uncertainty also exists as to whether partially enriched commodities less complete than now required under identity standards for "enriched" products should be permitted with proper labeling. Specifically urged as needing legislative consideration is the idea that "Vitamin D Added" should suffice to distinguish such materials from those fully "enriched."

Responsibility of FDA in protecting the careless or credulous customer is open to unlimited argument. In a recent orange drink case, the court said that a standard was intended to protect only the average consumer against misrepresentation. Comparable argument seems to be brewing over "oleo ice cream", in which vegetable fat is substituted for butter fat.

Cost-Cutting Packaging Special Coming

You no doubt are eager to reduce your packaging costs. And why not? They represent a big slice of total plant expense.

To help you, a special section containing 32 pages of practical cost-saving packaging articles will be published in the April FOOD ENGINEERING. Among these articles will be:

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How to Spot Inefficiencies in Packaging Lines
Cutting Down-Time by Effective Maintenance Procedures
Practical Devices That Improve Packaging Operations
Innovations in Packaging Machine Design and Construction
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But that's not all! Regular articles of value to all branches of the industry will supplement the packaging section.

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This machine forms and glues the blanks into sturdy finished cartons at speeds up to 102 per minute. If you are using prefabricated cartons, think what this will save you on materials. And if you are using cartons which you set up by hand, you'll make a striking saving in labor cost.

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Advanced-Unit Advantages

—Continued from page 65

91 freezing trays (8½ in. wide x 84 in. long) suspended on two 123-ft.-long endless chains. These move the trays continuously—from loading station, through a number of vertical passes, and then to the unloading area.

Temperature of −32 deg. F. is maintained within the unit by circulation of 48,000 cu. ft. air per minute over a bank of refrigerated fin coils. Baffles direct flow of air against each tray as it moves through the freezer.

Holding time of packages in freezing zone can be varied from 40 to 120 min. by means of variable speed drive. This permits synchronization of freezer with packaging operations. It also provides for complete hardening of all size packages.

Automated Novelty Process

Production of chocolate-covered stick novelties at 300 doz. per hour, with one man and two women, is said to effect a considerable saving in labor over methods presently used in other plants.

Employed is a Danish machine—made by Brodrene Gram A/S, Vojens—using a rotating table through which brine (−30 to −40 deg. F.) is circulated. Unit receives soft ice cream from a continuous freezer, inserts sticks, freezes, chocolate coats, and bags novelties in a continuous, automatic operation.

Ice cream is piped from a 150 gal./hr. C-P freezer to the feed hopper of the machine, from which it is extruded in measured amounts (3 oz.) into pockets in the rotating freezing table. Table has 160 rows of three pockets each. These are surrounded by circulating brine from time of filling to defrosting, which takes place just before confections are removed. To loosen products at this point, hot brine is circulated through a small portion of the table.

Freezing brine is refrigerated in a tank outside the processing room and circulated through the unit. Hot brine is fed from a tank integrated with the machine.

Sticks are automatically inserted in center of partly hardened bars when freezing table has moved approximately 180 deg. from filling station. Then, just before rotation is completed, table enters defrosting zone and dipping tongs remove confections from the pockets.

Bars are coated on a separate, integrated rotating mechanism comprising 16 arms, on each of which is mounted three dipping tongs. Arms

are automatically lowered to enable tongs to grip sticks of defrosted bars, then move upward to lift bars from pockets of freezing table.

As they continue to rotate, arms are again lowered to dip bars into melted coating, then are raised to permit excess chocolate to drain back into the rectangular storage tank. Chocolate level is maintained at all times by feed from a large melting tank.

Finally, approximately 27 sec. after dipping, bars are released from tongs and enter automatic bagging unit. Bagged novelties are chuted to a table, where they are hand-packed, 3 doz. per carton. Then the containers are taped and placed on a conveyor for delivery to the hardening room.

In the meantime, empty pockets in freezing table move under filler hopper and receive another charge of soft ice cream.

A unique feature of the machine is provision for easy cleaning of freezing table. Filling and stick-inserting devices swing clear. Then an umbrella-like frame, mounted on a monorail (see center photo p. 65) is lowered over the table and fastened to it. Table is raised out of brine tank, moved to the side of the room, and lowered against the wall. Here, it is accessible for cleaning and sanitizing.

The above units, together with automatic pint and cup filling machines, and Vitafreze Popsicle equipment, give Pioneer a complete packaging setup that is hailed as operating with minimum labor while assuring maximum protection of product quality.

End (Resume reading on page 66)

Cold Sterilization

—Continued from page 78

is to absorb the radiation so that it does not reach personnel. Beta rays are easily absorbed and present no real problem. X-rays, whether from X-ray sources or from inadvertent generation by beta rays, are hazardous because of their greater penetration.

An Atomic Energy Commission regulation is that no worker can receive more than 0.3r. of radiation in any one week. This rate is such that it is believed that no harm would be done even if it were continued throughout a lifetime. Shielding, therefore, is designed to reduce radiation to below this level.

Protection is, of course, easier when generators are used. They can be turned off at any time. But while the use of fission products will post some problems, these should not be insurmountable.

Costs of treatment will depend on many factors, some of which, at least, will be determined by individual requirements of each particular application. Some indication, however, can be gained from estimates which have been made in the Stanford Research Report, in which two calculations are provided, one for treating hams and the other for peas.

In processing hams, an estimate was made of the capital investment required to set up a fission irradiation plant to handle 10,000 lb. of 12-lb. canned hams per day. With fission products at 20c. a curie, total capital costs would be $155,000—including necessary fission products, shielding and supplementary equipment.

The curie, a unit of radioactivity, is a specific number of disintegrations per second and is approximately equal to the radioactivity of 1g. of radium. At this time, the actual cost of fission products is not known. Should they cost not 20c. but $2 per curie, then this plant would cost $1,055,000. Actually, it is believed that costs will initially lie somewhere within these two extremes.

Operating costs are another factor. With fission products at 20c. per curie—and with three workers, maintenance, utilities, supervision and overhead, taxes, and insurance—at prevailing rates, it would cost $240 a day to run this plant. With fission products at $2 a curie, this cost would be upped to $300.

Thus, with these operating and capital costs it would cost 3.1 per pound to process ham with 20c. per curie fission products; 7.7c. with $2 fission products.

In similar fashion, a pea plant with an output of 15,000 lb. per hour, 300,000 lb. per day, and a 120-day season also is estimated. Here, with operating costs at 0.3c. and capital costs at 1.4c. per pound, and using 20c. per curie fission products, it would cost 1.7c. per pound to process peas. And the capital investment would be $3,100,000.

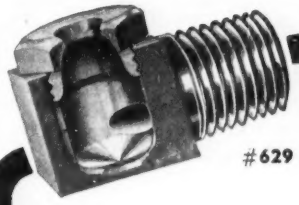
However, if fission products were made available at 1c. per curie, it would cost only 0.3c. to process each pound of peas, and the plant could be built for $250,000.

Costs using the Van de Graaff electrostatic generator are available. With a small unit handling 120 lb. of product per hour, the cost of processing would be $9 per hour, or 7.5c. per pound. Capital investment for equipment, would be $80,000.

With a high-production electrostatic generator—capable of handling 2,400 lb. per hour—cost of processing would be $36. per hour, or 1.5c. per pound of product. Cost of a high-production unit is about $400,000.

It is apparent that these costs are

THERE'S A MONARCH NOZZLE FOR EVERY SPRAY JOB



#629

In many Food Processing plants Monarch Spray Nozzles are used to . . . .

Wax Fruits
Rinse Vegetables
Powder Milk
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Wash Filter Cake
Humidify
Banana Rooms

Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

Send for Catalogs 6 A and 6 C

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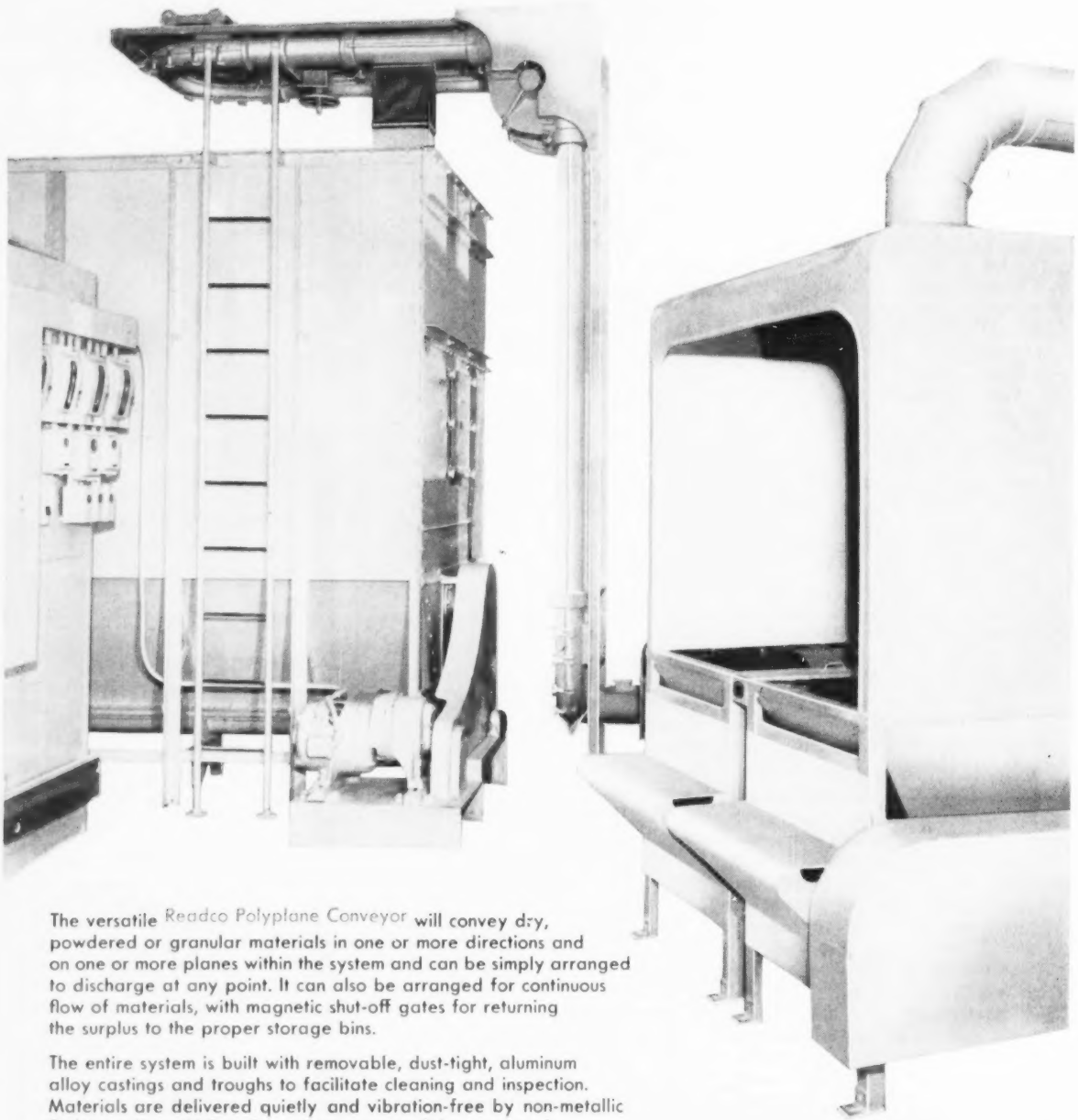
THE READCO POLYPLANE CONVEYOR

for dry powdered or granular materials



The versatile Readco Polyplane Conveyor will convey dry, powdered or granular materials in one or more directions and on one or more planes within the system and can be simply arranged to discharge at any point. It can also be arranged for continuous flow of materials, with magnetic shut-off gates for returning the surplus to the proper storage bins.

The entire system is built with removable, dust-tight, aluminum alloy castings and troughs to facilitate cleaning and inspection. Materials are delivered quietly and vibration-free by non-metallic flights or discs which make a clean sweep of the conveyor's smooth interior surfaces.

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READ STANDARD
CORPORATION

For more information, use coupon on page 157.

such that they can be considered suitable for the treatment of foods, at least in certain instances.

Research now in progress may be expected to reduce treatment costs and to solve the technical problems.

Above article is based on a paper presented at Chicago section of IFT in 1952. The charts presented on radiation requirements and penetration by electron beams, together with tables of costs of sterilizing hams by X-rays from fission products are taken from the Stanford Research Report.

End (Resume reading on page 79)

Square, Light Shipper

—Continued from page 95

Second, loaded aluminum baskets can easily be carried behind the retail counter, where the dressed chickens are dumped directly into iced bins. Previously, the chickens were removed from the cans, one or two at a time, and loaded into the bins.

Delivery Time Slashed

Prior to the adoption of the new lightweight baskets, test runs were conducted. It was shown that it took one man only 1 hr. to make a delivery that formerly required two men and 2 hr. to complete.

We also learned that aluminum cools more quickly than water-soaked barrels. Consequently there is a notable saving in refrigeration.

Trucks are now cleaner and odorless—conditions which were difficult to maintain with barrels. Also, the aluminum containers are much easier to clean.

The use of the new baskets has also improved the poultry's flavor. For the chickens no longer become water-soaked as was the case with barrels. The new baskets have drain holes.

We are now using 1,500 aluminum baskets, which were specially designed for us by Buck County Enterprises, of Quaker town, Pa. Of course, cost of the metal basket is several times that of a barrel. But the new container is good for a long life, whereas a barrel lasted only 4-5 months.

Our firm now employs 85 workers, who process 10,000 chickens daily. Chickens are killed within a few minutes of arrival at the plant, rather than fattening for about a day to make up for the ½-lb. loss in transit. We believe it best to take this weight loss instead of holding the birds under unnatural conditions.

About 1,000 turkeys are also provided weekly from our own farm.

End (Resume reading on page 96)

Preventive Maintenance

—Continued from page 76

that order are summarized to obtain total material cost.

To know what parts to stock, we were guided by past experience, manufacturers' recommendations, market conditions, and our production schedules. The investment in parts and supplies is so great that proper stores' records and control are highly essential. Perpetual inventory of all items carried, and the use of storeroom withdrawal orders, therefore, become important phases of preventive maintenance.

Storeroom control is designed to assure safety in production schedules by maintaining a sufficient quantity of spare equipment parts and material to carry out these schedules.

The plant engineer must use good judgment in setting the minimum and maximum requirements for each commodity, and it is recommended that he review these estimates semi-annually to make sure that the quantities carried are not too high or too low.

Where the plant is large, a capable storeroom attendant will save the cost of his salary many times in anticipating the demands of the plant, so that the operation of both the maintenance and production departments can continue without interruption.

Monthly Reports

Any program, to be effective, must be checked periodically to determine whether it is functioning properly. This is especially true of multi-plant maintenance operations that are administered from a central office.

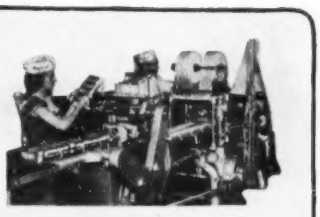
We developed a form as a checklist to be prepared monthly by the maintenance clerk and submitted to the manager of the mechanical division. This is the *Monthly Report of Preventive Maintenance Inspections.*

The summary of inspections scheduled, completed, incomplete, critical points found, jobs resulting, and jobs completed is compared, month by month. If the preventive maintenance program is functioning properly, it will be evidenced by a gradual decrease in jobs—by virtue of the scheduled inspections.

Downtime

One of the best measures of the effectiveness of a sound preventive maintenance program is the reduction of mechanical downtime.

Formerly, some of our plants kept a log of breakdowns, and the data thus gathered was used for planning



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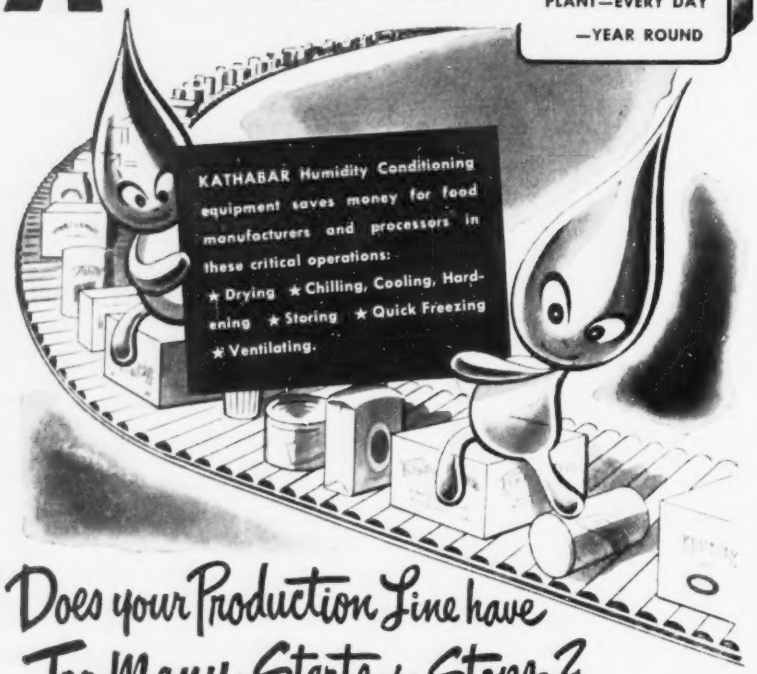
"LUBRIPLATE greatly reduces unnecessary wear and prolongs the life of machines. It has reduced customer calls for service to a minimum. Our Service Engineers can readily spot machines that have had other than LUBRIPLATE Lubrication, as these machines do not give the service they should."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

Kathabar

MAINTAINS IDEAL PRODUCTION WEATHER IN YOUR PLANT—EVERY DAY —YEAR ROUND


KATHABAR Humidity Conditioning equipment saves money for food manufacturers and processors in these critical operations:
★ Drying ★ Chilling, Cooling, Hardening ★ Storing ★ Quick Freezing ★ Ventilating.

Does your Production Line have Too Many Starts + Stops?

Some typical applications where Kathabar Humidity Conditioning has permitted *continuous* operations in the food industry are: ★ Bakery product drying ★ Gelatin drying ★ Sugar cooling after refining ★ Sugar-coated breakfast food manufacture ★ Candy cooling with sub-freezing air ★ Coffee, chewing gum, and grain products manufacture.

For cost-minded executives: In many cases, Kathabar equipment has paid for itself in the first year.

May we give you more information on whom we serve, and how we can serve your company? Just fill out the coupon below.

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Surface INDUSTRIAL FURNACES AND BURNERS
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☐ Send me case histories and complete information on Kathabar humidity conditioning equipment.

☐ Send me information on.....
(Write here any special humidity problem you may have)

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COMPANY.....
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improvements and determining where weakness existed in a particular production department or on specific equipment.

From this, our *Mechanical Down-time Report* was developed to give our maintenance mechanics a uniform way in which to note machine and equipment downtime for the maintenance office.

The data listed on the form are machine inventory number, time lost due to breakdown, and action taken. Each mechanic carries a few of these mechanical failure forms during a scheduled production period. And he indicates on them the shutdown duration for any production unit affected.

The data listed on the downtime reports are reviewed daily by the plant engineer to determine whether the breakdowns noted were due to poor workmanship, faulty material, or other causes. And an effort is made to avoid a repetition of the failure. The data also serve as subject matter for review at the plant weekly maintenance meeting.

As downtime records are accumulated, it may become evident that a particular production unit is constantly in need of repairs and adjustments. If the cause for these repairs and adjustments can be eliminated by overhauling the unit, the plant engineer makes arrangements for a scheduled shutdown so that all necessary repairs can be made at one time.

End (*Resume reading on page 77*)

Workers Spot Hazards

—*Continued from page 93*

hog-cutting room were required to wear metal-mesh glove-like guards on their work-holding hands, they tended to consider the practice a reflection on their dexterity, in which they took understandable pride. And so they insisted that the hand-and-wrist coverings were "clumsy" . . . would slow them down . . . lower their speed and efficiency.

Nevertheless the ruling was enforced. And now efficiency is up and accidents are down. The metal-mesh guard is appreciated. There does remain, however, some evidence of piqued vanity—for many a cutter now hides his metal guard under a cloth glove.

Does "Incentive" Up Mishaps?

By some, at least, the conviction is held that incentive plans encourage accidents. This belief is based on the presumption that where there is a rais-

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gives finer flavor . . . greater sales appeal . . . to your products

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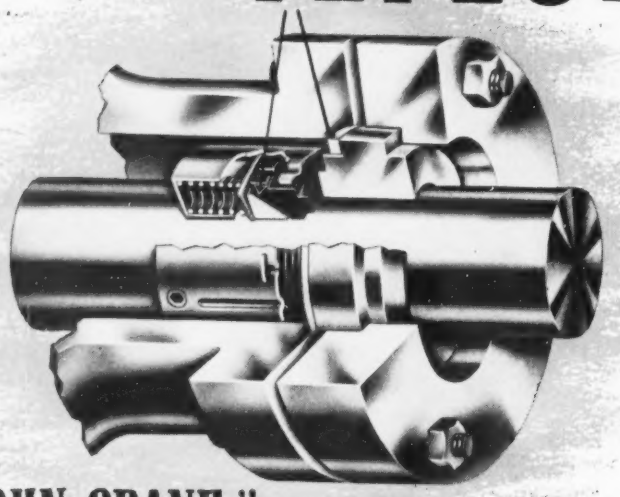

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Mechanical Seal

Prevents Leakage of:

- √ VISCOUS AND NON-VISCOUS LIQUIDS
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- √ OILS AND SYRUPS
- √ ACIDS AND ORGANIC FLUIDS

This revolutionary seal was developed by Crane Packing Company after two years research and field testing—expressly for use with hard-to-handle chemicals. Its flexible wedge ring and sealing ring are molded from the remarkable new plastic, Teflon, which is not affected under any known corrosive service.

John Crane engineers thus put the unique properties of Teflon—high heat resistance, extremely low friction and chemical inertness—to practical use in the Type 9 Seal. Result: a new, efficient way to handle corrosive liquids and acids that never before could be effectively controlled by conventional, flexible-type mechanical seals It can be employed at temperatures up to 500°F.

The Type 9 Seal gives consistently dependable service on all rotating shaft applications, such as centrifugal pumps, turbines, speed reducers, positive displacement pumps and agitators.

Other John Crane Teflon Products include expansion joints, C-V Rings, packings and gaskets. Also, parts molded or machined to your particular requirements.

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ing of individual output by incentives, a self-generated speed-up is entailed that many increase end-of-shift fatigue or at least may inculcate callousness that can invite accidents.

Whatever may be the result of incentives on accident-incidence or severity in other plants, experience at Felin's over a 5-yr. period indicates a declining accident rate in the 16 out of 31 departments in which there is some type of incentive system.

Here's the record of some 40 company employees in the department where bacon is sliced and packaged—and where extensive use of machines and the variety of operations performed carry considerable injury potential.

Five years ago, in this area, the lost-time accidents numbered five. Then, during the following year, the department was given an incentive. Accidents thereupon went down to 3, and only one of these resulted in lost time. Finally, there were no accidents during the past year, and accordingly no lost time due to mishap.

It would be difficult, if at all possible, to precisely name and "weight" each factor contributing to Felin's unusually low accident rate in a branch of the industry whose national accident-incidence rate is high. But there can be no doubt that a notable portion of the credit is due the various plant workers who have served on the safety committee.

End (Resume reading on page 94)

Air-Gap Weighing

—Continued from page 63

ing rate of feed by vibrators. A single, large dial simultaneously changes feed rate to all four weigh hoppers.

Since the machine operates on the net-weight principle, accuracy of fill is not affected by variations in the density of a given product, as is the case with volumetric fillers. And when the filler is changed from one product to another, weight of fill is quickly changed by adjusting dials. These dials vary tension on a spring attached to the cantilever weigh beams (see diagram).

These adjustments can be made while the machine is operating. And when once set to handle a given weight of product, weighing beams seldom require re-adjustment.

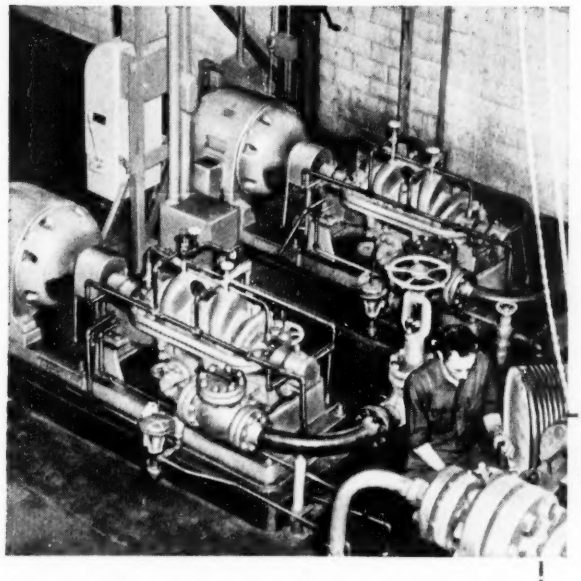
Also, dials on either side of each weighing head adjust the air pressure in the pneumatic-control system.

The new weighing machine is optionally equipped with a photoelectric no-carton, no-fill device. This auto-

Plastics plant saves $4,000 in one year!*

Read how you, too, can save with . . .

PURE OIL INDUSTRIAL LUBRICANTS



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Regardless of the type of machinery you have in your plant, our industrial engineers can nearly always help you to reduce your lubricants inventory . . . simplify your lubricating procedure . . . minimize waste and error.

Mail coupon today for free "Simplify and Save" booklet giving full details on how to start a labor-saving, money-saving, lubrication program in your plant.

*Oxygen pitting was destroying the high pressure water pumps in General Electric's Coshocton, Ohio, laminated plastics plant. Rod packing had to be replaced every three days. Pure Oil's sales representative suggested adding PUROSOL No. 10 to the water. Result: damage stopped—and a saving of $4,000 a year.

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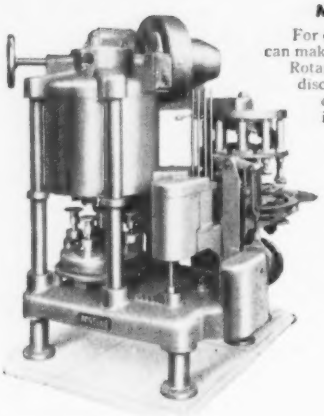
cut costs with Angelus Seamers

More canners and can manufacturers throughout the world are switching to Angelus Seamers for greater production economies, lower investment costs and minimum maintenance. Angelus Seamers, the products of more than 40 years of experience in developing and manufacturing, are the ultimate in simplified, rugged, efficient design.

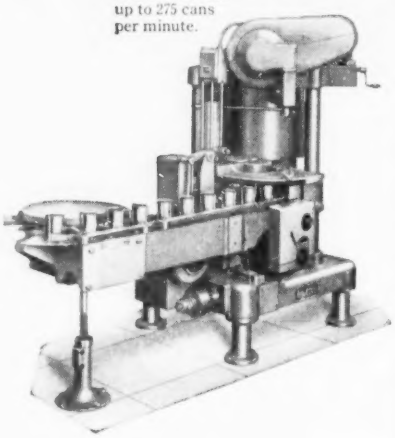


Model 40P-DF

For can closing and can making. Automatic Rotary Seamer with disc feed for round cans 2⅛" to 4¼" in diameter and up to 275 cans per minute.

Model 40P-MSLF

With chain feed for can closing only. Automatic Rotary Seamer for round cans 2⅛" to 4¼" in diameter and up to 275 cans per minute.



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Write today for complete details on models and an Angelus Engineered Application Recommendation.

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Sanitary Can Machine Company

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matically stops the machine when cartons fail to arrive in position under the filling funnels and it restarts the unit when they again arrive properly.

The machine operates in cycles on a single-revolution type of clutch. Before a cycle starts, all scales are tripped and product falls into cartons positioned under the filling funnels.

When a carton is not on the intake conveyor directly in front of a photocell, a light beam from a lamp strikes the cell. The photocell then operates a clutch solenoid to stop the machine and thus prevent dumping of the material onto the floor.

Another cost-saving device is the carton-liner spreader, designed to avoid spillage at high-speed filling and to remove dust arising from product going into cartons. Employed is a suction device that now replaces the mechanical fingers formerly used to spread carton liners under the funnels. A long, inverted-U-shaped suction hood is attached to the bottoms of the funnels. A fan, driven by a ½-hp. motor, creates the suction that pulls sides of liner apart at the mouth.

Still another device—a mechanical stop—blocks movement of cartons on the conveyor and lines them up under the filling funnels. After the cartons are filled, the stop releases them, letting new group move in.

End (Resume reading on page 64)

Pickle Sweetener

—*Continued from page 98*

Sweetose without unfavorably affecting the acceptance of the product. However, substitution of 62.5 (A.6), and 75 (A.7) resulted in a low acceptability by both consumer taste panels and the industry members.

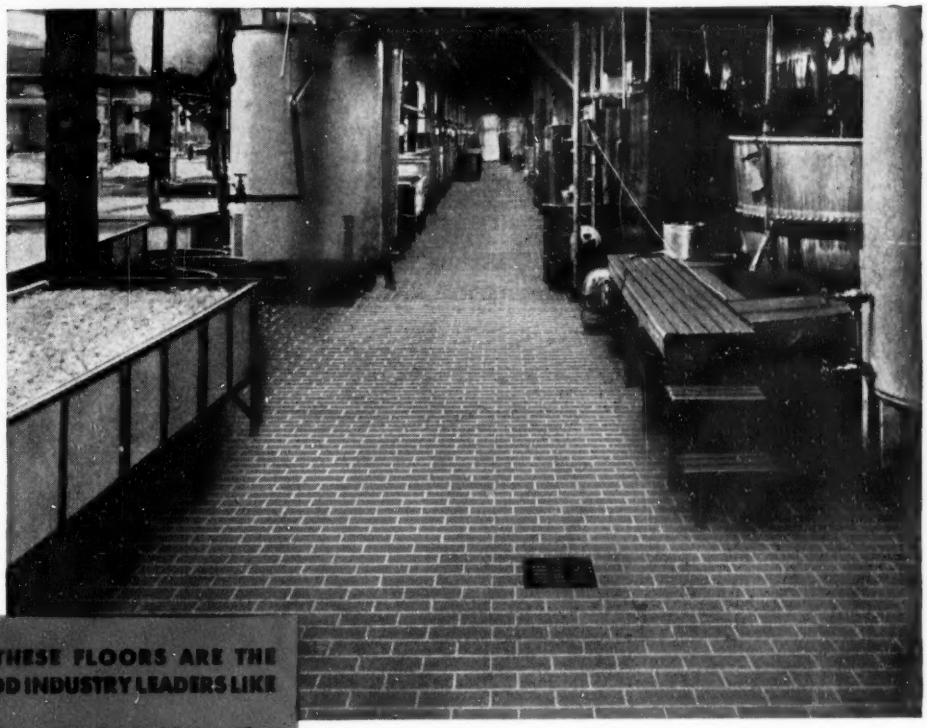
Two groups of bread and butter pickles (1.4 percent salt) were made with fresh cucumbers. One group (BB.1, 2, 3) contained 11 gr. acid and 0, 25 and 50 percent, respectively, Sweetose. The other group (BB.4, 5, 6) contained 15.5 gr. acid and 0, 25 and 50 percent, respectively, Sweetose.

Data ("E," Table) indicate that, on the basis of consumer taste panels, bread and butter pickles made with 25 percent or more of Sweetose have less acceptability than similar products produced with all sucrose. Since one group (BB.1, 2, and 3) contained considerably less acid than the other, it is unlikely that decreasing the acid content would result in increased preference for the product containing Sweetose.

Complete agreement of the two

DREHMANN INSTALLATIONS

Top Them All!



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9 POINTS OF SUPERIORITY

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Remember, when planning new construction, solve the floor problem at the start by instructing your Architect to specify Drehmann.

Write for Bulletin M-1 "Modernize Worn Floors Economically."

DREHMANN PAVING AND FLOORING CO.

ORIGINATORS OF BRICK FLOORS *ESTABLISHED 1869*

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It's a fact. No floor of any type can match Drehmann Sani-Brick installations for good looks, sparkling cleanliness, economy and ability to stand the gaff.

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Furthermore, when you specify Drehmann Sani-Brick, you get a floor designed, engineered and installed by the Drehmann organization itself. This assures quality control of every detail—undivided responsibility for the complete job—and above all, a floor designed to meet the individual requirements of your operation.

Sani-Brick can be installed right over your present floor. Drehmann has perfected a technique that enables them to do the work while your plant runs full blast. No costly down time. No interference with production. Ask our nearest office to have a Drehmann Flooring Engineer give you the details.

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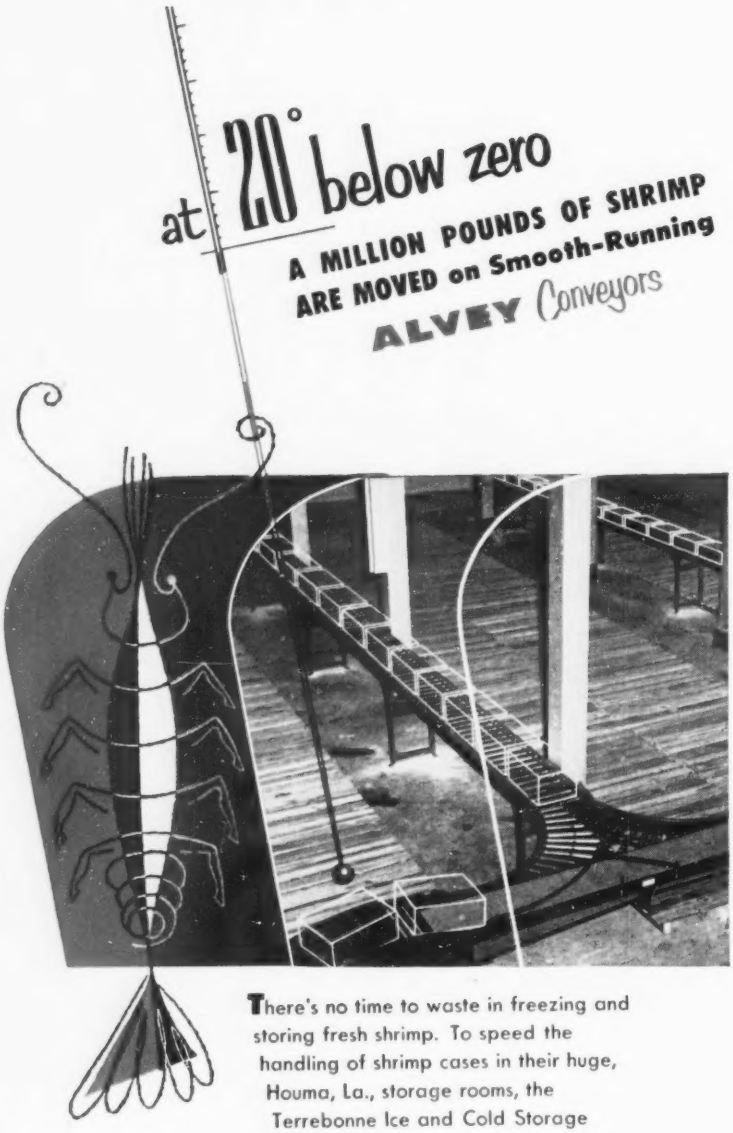

There's no time to waste in freezing and storing fresh shrimp. To speed the handling of shrimp cases in their huge, Houma, La., storage rooms, the Terrebonne Ice and Cold Storage Company chose an ALVEY Conveyor System engineered to do the job at sub-zero temperatures. ALVEY's experience in designing conveyor systems for cold storage plants and freezing tunnels helped make this modern, time and money-saving installation possible.

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BRANCH SALES OFFICES IN PRINCIPAL CITIES

consumer panels with respect to the low acceptability of the pickles containing the Sweetose gives added significance to the analyses of food products by consumers, while the lack of agreement shown by the tasters in the pickle companies causes serious doubt as to the effectiveness of such types of testing when relatively small numbers of tasters are employed.

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The above feature story is designated Journal Article No. 1305 of the Michigan Agricultural Experiment Station, and is published with approval of the Station director—The Authors.

End (Resume reading on page 99)

Trims Variation Losses

—Continued from page 81

on production lines. The system is still new, but research is continuing with the object of expanding it to all operations.

Control of rejects is exercised at four major points: (1) Before centers go through the caramel-coating unit, (2) as the bars emerge from the peanut-tumbling machine, (3) at the chocolate enrober to determine breakage in conveyor belt, and (4) at the packing station to determine amount of bars broken during wrapping.

Daily reports are obtained of the amount of scrap at these stations. Complete reports are then submitted to all supervisory personnel. This data is also charted on a long-range basis to show any trends.

R. A. Brock, vice-president in charge of production, sees increased possibilities in statistical-control methods. He feels that they may be applied to all operations. They serve as a production guide and control.

The benefits of statistical control are already high at Brock—and there will be additional advantages as operating personnel become more familiar with the system and take a fuller part in it.

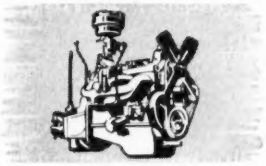
End (Resume reading on page 82)

NEW HORSEPOWER!
NEW BRAKING POWER!
NEW EARNING POWER!

Biggest truck values of the year! New, just-announced Dodge trucks with features like . . .

7 high-compression engines, with 100 to 171 horsepower, give you more ton-miles per hour, more deliveries per day! New styling inside and out, tough new floors in pick-up and panel bodies, new tighter-than-ever tailgates on pick-ups and expresses! A total of more than 50 brand-new features to boost truck earning power!

More, you get such famous Dodge extra values as lightweight aluminum-alloy pistons, rivetless Cyclebond brake linings on all hydraulic brakes, moistureproof ignition, shot-peened rear axle shafts! Get more truck for your money . . . see your neighborly Dodge dealer!



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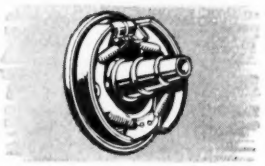
7 high-horsepower engines! 3 brand-new, with increased displacement, greater cooling capacity, twin carburetion available on larger trucks!



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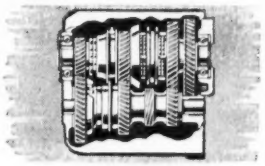
Super-safe brakes stop smoothly, easily, with less pedal pressure! New increased stopping ability on 1- thru 2½-ton trucks!



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NO GEAR-SHIFTING!

Truck-o-matic transmission with gyrol Fluid Drive available on ½- and ¾-ton models! Saves shifting, yet lets you rock out of snow, mud!

NEW!

OVER 50 FEATURES!

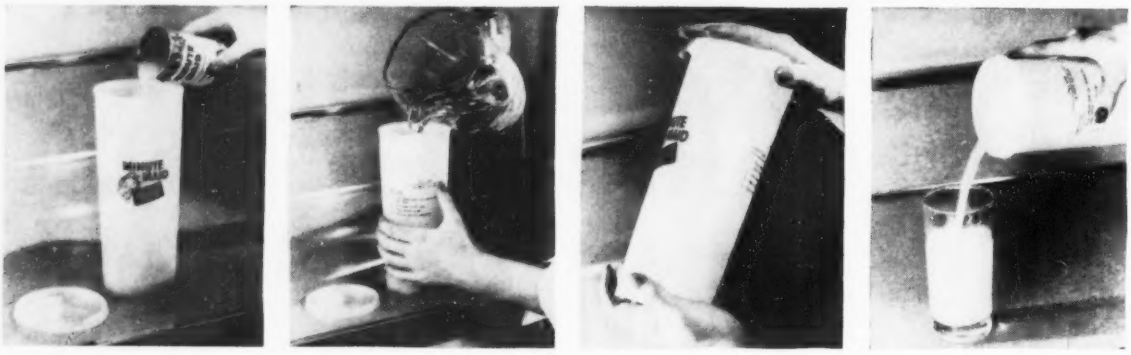
Reinforced cab construction, larger exhaust system, new 116″ wheelbase ½-ton pick-up! Dodge-Tint glass, higher output heaters available!

There's one to fit your job . . . ½-ton through 4-ton. See your friendly Dodge dealer.

DODGE "Job-Rated" TRUCKS

For more information, use coupon on page 157.

NEW PACKAGES & PRODUCTS



Company Designs Own Mixer for Consumer Use

Minute Maid Corp., Plymouth, Fla., keenly aware of the value of offering the consumer easier and more practical ways to use a product has had a container designed in which to prepare, store and serve its frozen concentrated orange juice.

The container, designed and molded by Tupper Corp., Farnumsville, Mass., of "Bakelite" polycthylene plastic, carries the Minute Maid logotype on one side with directions for use on the other.

Following simple directions will result in the proper reconstituting of the orange juice, better storage results and easier handling.

As pictorially shown above, water is simply added to concentrated juice until mixture is seen through the translucent plastic to reach line marked on container side. Mixer is then sealed by gently pressing top down so that it grips securely around entire rim. Last two steps in the simple directions are to shake briskly, serve, or store in refrigerator. The non-drip pouring spout with a small removable cap attached thereto makes it easier to pour and reduces exposure.

The plastic is said to stay flexible over a wide range of temperatures, is easy to wash and highly resistant to water, food, grease and most chemicals.

These mixers are available at nominal cost wherever Minute Maid frozen orange juice is sold.

Wine Vinegars Marketed in Attractive Cruets

San Martin Vineyards Co., San Jose, Calif., is now marketing its wine vinegars in flint glass cruets (Glass Containers, Inc., Los Angeles). They are available in either a 12.8- or 25.6-oz. size. A glass shaker is also provided on the 12.8 oz. bottle.

To enhance the appearance of the package and to give additional protection, a combination "Celon" (Northern Glass Co., San Francisco) seal and label (Kirby-Cogeshall-Steinau Co., Milwaukee) are applied over the closure (Western Crown Cork & Seal Corp., San Francisco).

Five wine flavors are now being processed. They are: red, white, garlic, tarragon, and French onion. The last name is the newest flavor to be marketed.

New Pre-Pack for Meats

Oscar Mayer & Co., Madison, Wis., is now marketing its line of Canadian bacon and luncheon meats in eye-stopping packages. And, not only do they present a striking display but the unique packaging provides protection against drying out, as well as a durable self-service unit.

Each package consists of a tinplate base with saran film (The Dow Chemical Co., Midland, Mich.) drawn tightly over product.

Actual packaging operation includes drawing a vacuum with a closing machine, then crimping metal base to a paperboard ring. The result is an airtight seal between saran and metal base. To open, simply cut the film as base.

For Package Data Use Reader Service

KEEP A FIRM GRIP ON ELUSIVE QUALITIES

...with tailor-made Riegel papers

A few things RIEGEL can do for you . . .

- Keep products dry
- Keep products moist
- Retard rancidity
- Seal with heat or glue
- Provide wet strength
- Stop grease penetration
- Retain aromas, flavors
- Resist extreme cold
- Reduce breakage
- Prevent sifting
- Protect from light
- Resist alkalis
- Resist corrosion
- Boost machine efficiency

The vital qualities of today's "best sellers" create many problems in protective packaging. A delicate aroma "just disappears." A fine oil carefully processed into the product may stain the wrapper. Or a delightful crispness may revert to a sad sog. These are problems Riegel has solved over and over again, for hundreds of products from soap, dessert powders and coffee to X-ray films and ball bearings. In one case the answer may be a wet-strength greaseproof . . . in another it may be a triplex lamination of foil and special glassines. Whatever *your* package may need, Riegel can develop the right papers . . . quickly, efficiently, economically.

Write to *Riegel Paper Corporation, P. O. Box 170, Grand Central Station, New York 17, N. Y.*

Riegel FUNCTIONAL PAPERS FOR PROTECTIVE PACKAGING

▸ WRITE FOR SAMPLE BOOK

For more information, use coupon on page 157.

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Sanitation Services FOR FOOD PLANTS

Engineered to Your Needs

- ★ Plant Sanitation Survey
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There's a Klenzade field technician near you. His services in helping you plan a complete Plant Sanitation Program are yours without obligation. Write us now.

KLENZADE PRODUCTS, Inc.
BELOIT, WISCONSIN

Concentrated Non-Frozen Fruit Drinks Offered

A variety of fruit beverages in a concentrated, non-frozen form, has been developed by Snow Crest Beverages, Inc., Salem, Mass.

Six flavors are being introduced—orange, lemon and lime, strawberry, raspberry, cherry, and grape. The last four named are said to contain 95 per cent fresh fruit juice.

Packed in 4-oz. cans, they are easy to store and handle. No refrigeration is necessary and product will keep indefinitely at room temperature.

The sales campaign slogan, "Quick as a wink—pour, mix, and drink!" explains ease of preparation. Contents poured into a 1-qt. container, which is then filled with water will make one quart of non-carbonated fruit beverage.

The cans (American Can Co., New York City) are lithographed in blue and white, and carry a Teddy Bear motif against a background of snow-capped mountains.

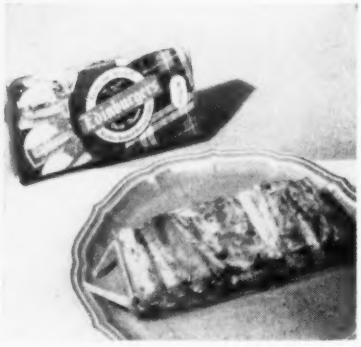
Present plans call for initial distribution in Florida with national distribution to follow shortly thereafter. At present product is being sold only in 4-oz. cans, packed 48 to case, but it is reported that it will soon be available in institutional sizes.

For Package Data Use Reader Service

Cottage Cheese for Lent

Following its success last year in promoting Sealtest cottage cheese during Lent by packing it in circus illustrated glass tumblers, National Dairy Products Corp., of New York City, again used the same theme with an extra punch added, through its television circus show, The Big Top.

The glasses this year, designed by Roy McKie, present various creative concepts of the exciting acts presented on the TV show. Gay and sparkling they show jugglers, aerialists, cyclists, wild animals, bareback riders, magicians, and other tanbark artists.



Scotch "Edinburgers"

From Scotland comes a new herring treat. Quick frozen, Scotch, skinless smoked herring fillets, product of British Kipper Exporters, Ltd., Edinburgh, Scotland, are now making their appearance in many retail stores on the American market.

The small fillets are carefully packed in a cellophane bag and placed in an 8-oz. waxed, chipboard box. This is

overwrapped with a waxed paper, colorfully illustrated, on one side with a famous plaid of Scotland, while the other half shows an attractive arrangement of the fillets prepared as appetizers.

The fillets are ready-to-eat (merely thaw at room temperature) and can be served either hot or cold. Suggestions for use are given on the bottom of the carton.

Tailored for Baby

Teething biscuits developed exclusively for babies have been introduced by Gerber Products Co., Fremont, Mich.

No detail was overlooked that would contribute to the specific requirements of baby and parent. First, a formula for a nourishing, easy-to-digest item was worked out. Ingredients include wheat flour, brown sugar, corn flour, powdered whole milk, dried yeast, dicalcium phosphate, leavening, and salt.

Then, other factors given serious study involved presenting a product shaped so as to be easily held, smooth-surfaced for protection of babies' gums, extra hard to prevent breaking or crumbling, long lasting and easy to carry.

With these problems solved, the company turned to designing a package that would keep the product fresh and hygenically safe. This was achieved by individually packaging each biscuit in heat-sealed cellophane. Ten of the individually wrapped biscuits are placed in a chipboard box which is doubly protected. First a thermo-plastic foil, laminated to tissue, forms a secure seal around the box. This is then overwrapped with multi-color printed waxed-paper carrying the well known Gerber trademark and photographic reproductions of the biscuits.

An H&D idea for you
WHEATIES
"Breakfast of Champions"
This Highly Dependable corrugated box protects and promotes its contents in transit and warehouse. Write for booklet "Creative Package Engineering." Hinde & Dauch, 5315-C Decatur Street, Sandusky, Ohio.
H&D
HINDE & DAUCH
17 MILLS AND FACTORIES • 40 SALES OFFICES
Our 65th Year

For more information, use coupon on page 157.

This Picture IS WORTH 1000 WORDS! Show

to Your Drivers

WHEN IT COMES TO TRAINING industrial truck operators, one picture is worth a thousand words. Clark's new "Safety Saves" movie is the only driver safety-training film in the materials handling field. It's a 30 minute sound movie, filmed entirely "on-the-job", and it's available to you on a loan basis.

1. "It's fun to watch the scenery; it's safer to watch the road."

2. "All right then . . . you won't make that mistake again!"

You (and your drivers) will see hair-raising examples of how *not* to handle a fork truck, as demonstrated by Willie the Cowboy. After you've seen Willie's way, you'll see the safe, correct way to drive and take care of a truck. To help cut accidents and improve driver performance, *all* your drivers should see "Safety Saves". Use the coupon to indicate when you want it—the only cost to you is return postage.

CLARK ELECTRIC AND GAS POWERED
FORK TRUCKS
ANG. POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION
CLARK EQUIPMENT COMPANY • Battle Creek 14 Mich.

Send "Safety Saves": Date wanted_____
Alternate dates_____
Name_____
Firm Name_____
Street_____
City_____ Zone_____ State_____

Form-Fitting Polyethylene Poultry Bags

Round-bottom polyethylene bags, formerly offered only in custom-printed form by Shellmar Products Corp., Mount Vernon, Ohio, are now being made available as an unprinted stock item to all poultry packagers.

Shellmar's "Shellene" bags are specially designed to conform to shape of dressed poultry. They are fabricated from extruded polyethylene tubing which eliminates the back seam and gives a tough, translucent container which offers good visibility and yet protects birds from contamination and handling damage. A variety of sizes to handle all types of poultry, from small fryers to large tom turkeys is offered. They are said to be watertight with a low rate of water-vaporproof transmission.

Their after-purchase use as storage and refrigerator bags, in addition to their protective and eye-appealing features, add to their popularity.

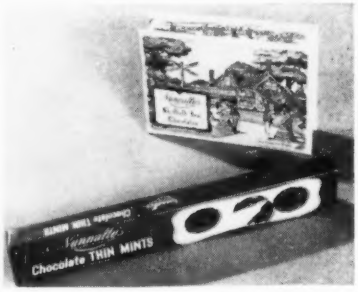
A few firms who have been successfully using this type of bag includes, Dinsmore Duck Farm, Dinsmore, Fla., Biggers Bros. Inc., Charlotte, N. C., and Michigolden Duck Farms, Hemlock, Mich.

For Package Data Use Reader Service

Soup in Frozen Form

Frozen, concentrated split pea soup is now being widely marketed in the western states by Andersen's Foods, Inc., Santa Barbara, Calif. (This company won FE's 1951 Food Technology Achievement Award for its application of a revolutionary short-time aseptic process of canning non-frozen pea soup. See FE, p. 67, June '51).

Initially sold as a specialty product, popular acceptance prompted the company to market the frozen soup as a standard item and has stepped up production to the extent that it is now being distributed in eleven western states. Sold originally in paper cartons it is now being packaged in 11-oz. cans (Continental Can Co., Inc., New York City).



"Sweet" Boxes Redesigned

Fine Products Corp., Augusta, Ga., has recently redesigned two of its candy packages in order to secure bet-

Only one tapered roller bearing gives you all these 10 advantages...

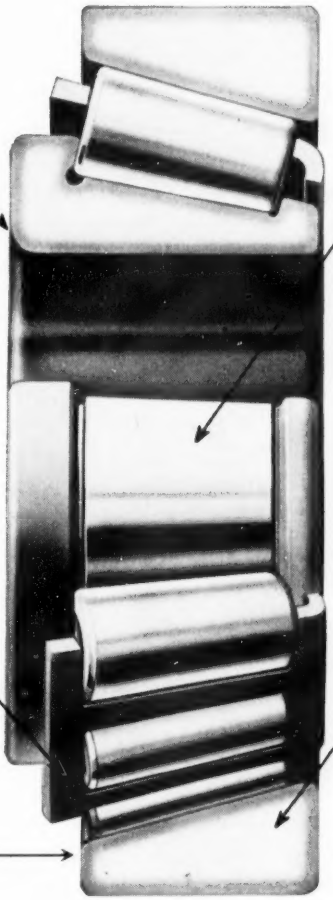
1 **GENEROUS RADIUS**—for greater shaft strength.

2 **CHOICE OF 26 DIFFERENT TYPES.**

3 **SOFT STEEL CAGE**—to keep rollers separate and prevent scuffing.

4 **PRECISION MANUFACTURE**—which makes possible bearings with a maximum runout tolerance of less than 75 millionths of an inch.

5 **CASE-HARDENED BEARING SURFACES**—to resist wear.



6 **MICRO-INCH SURFACE FINISH**—to minimize friction.

7 **CHOICE OF 5850 SIZES.**

8 **TIMKEN FINE ALLOY STEEL**—specially developed to give long bearing life.

9 **TOUGH CORE**—to resist shock.

10 **POSITIVE ROLLER ALIGNMENT**—gives maximum bearing capacity.

...it's stamped with the trade-mark "TIMKEN®"

NO other bearing gives you *all* the advantages you get with Timken® bearings. Ten of these advantages are listed above. They result from the fact that the Timken Company is the foremost producer of tapered roller bearings and leads in 1) advanced design, 2) precision manufacture, 3) rigid quality control, and 4) special analysis steels.

Be sure that every bearing you use in the machines you build or buy is stamped with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

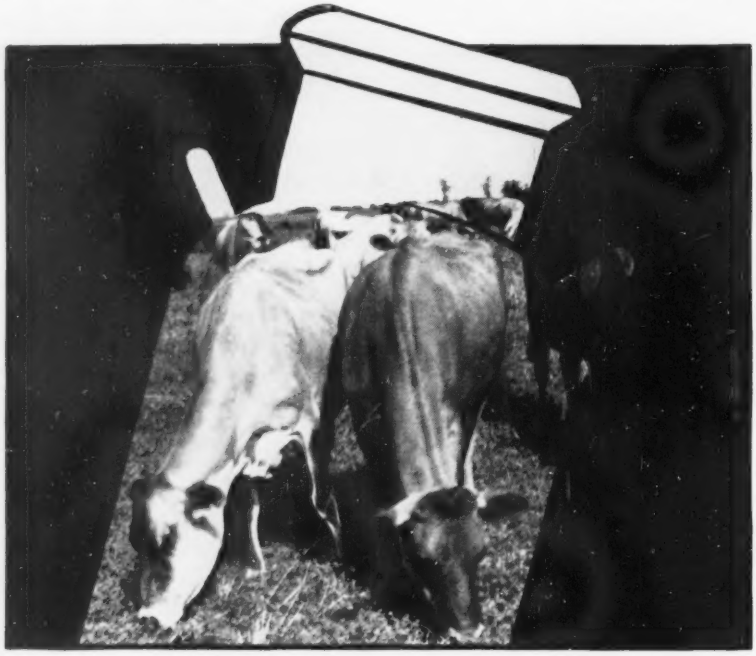
TIMKEN

TAPERED ROLLER BEARINGS

NOT JUST A BALL — NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER — BEARING TAKES RADIAL — AND THRUST — LOADS OR ANY COMBINATION

For more information, use coupon on page 157.

MISSISSIPPI . . . First Again!



. . . with a New Livestock and Poultry Production Plan

The milk can, trade mark of the dairyman, is a familiar sight along Mississippi's highways and farm-to-market roads in 1953. It is the symbol of a growing new industry.

Mississippi today is a leading dairy, poultry and livestock-producing state, and has another first to its credit which promises greater dividends for both the producer and the processor. To encourage the state's rapidly growing dairying, livestock and poultry industry, the Mississippi legislature has adopted an act and set up a guaranty fund to encourage banks and other lending agencies to make long-term livestock and poultry production loans to qualified farmers of Mississippi.

Mississippi, third among all Southeastern states in the number of milk cows on the farm, second in poultry production, and first in livestock, offers processors of these products unlimited opportunities.

In addition to the advantage of having convenient raw materials, Mississippi's BAWI law—another first among states—permits communities to vote bonds to provide a site and construct a building to house processing industries.

With raw materials and a plant within your reach, you can't afford to overlook the opportunities offered under these two programs. Get the details today. Write:

MISSISSPPI

MISSISSIPPI AGRICULTURAL

The BAWI State

AND INDUSTRIAL BOARD

State Office Building

Jackson, Mississippi

ter eye appeal and give more emphasis in counter displays.

The chocolate thin mints which have a bitter-sweet, rough coating, now appear in a narrow shipboard box over 1-ft. long. Each 6-oz. package contains ten individual cups of two mints each. The box is colorfully designed in maroon and white with mints appetizingly illustrated.

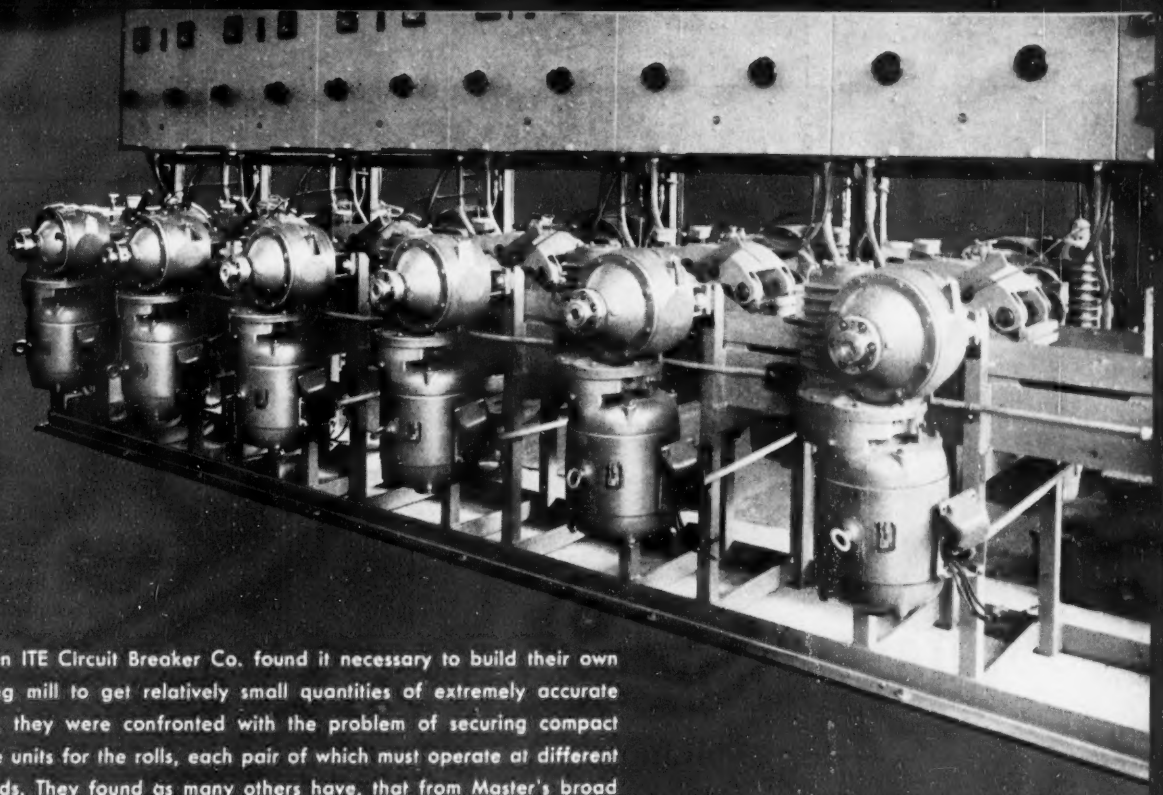
The Sheffield Inn assortment, consisting of 22 different kinds of chocolates, 50 percent milk and 50 percent dark, are available in a newly designed 1-lb. box. Harry Hurst, Atlanta artist, redesigned box in pastel colors reflecting the gracious living of the Old South. Ladies and gentlemen in colorful costumes are shown strolling around the historic inn.

Product identity is retained in both packages with the company's, "Nunnally's—The Candy of the South", logotype prominently displayed.

Midget "Corn-on-the-Cob"

After much research Ries Finer Food Div., Swiss American Food Co., Chicago, has succeeded in developing a midget corn which is completely edible, cob and all. It is processed as a pickle treat, both sweet and dill.

The corn is specially grown on the company's farm in Wisconsin where it is picked at the height of its goodness and rushed to the processing plant. There it is husked and processing begins. A special operation softens the cob so as to be edible. The corn is then vertically packed into 5-oz. jars (W. Braun Co., Chicago, and Anchor Hocking Glass Corp., Lancaster, Ohio) brined, capped (Closures: Crown Cork & Seal Corp., St. Louis, Mo.) pasteurized, and finally labeled.



When ITE Circuit Breaker Co. found it necessary to build their own rolling mill to get relatively small quantities of extremely accurate strip, they were confronted with the problem of securing compact drive units for the rolls, each pair of which must operate at different speeds. They found as many others have, that from Master's broad line of Gearmotors they could select standard units which would give them the RIGHT horsepower, the RIGHT shaft speed in one compact unit that they could use RIGHT where they wanted it.

Probably you will never design a rolling mill. But the next time you need motor drives for your plant or product, remember that Master Motors, available in thousands and thousands of types and ratings, give you a selection you can get nowhere else.

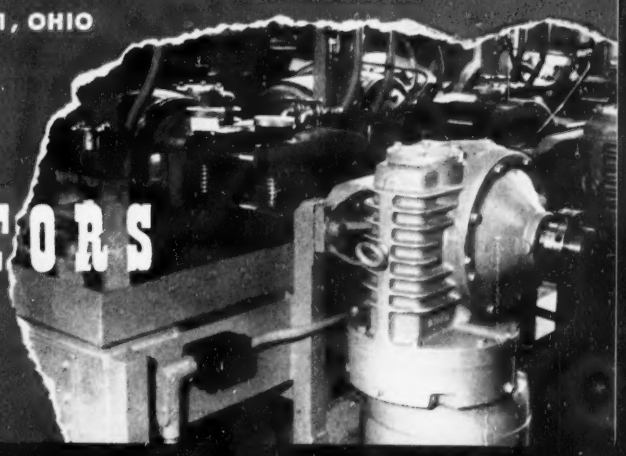
tough problem . . . easy solution

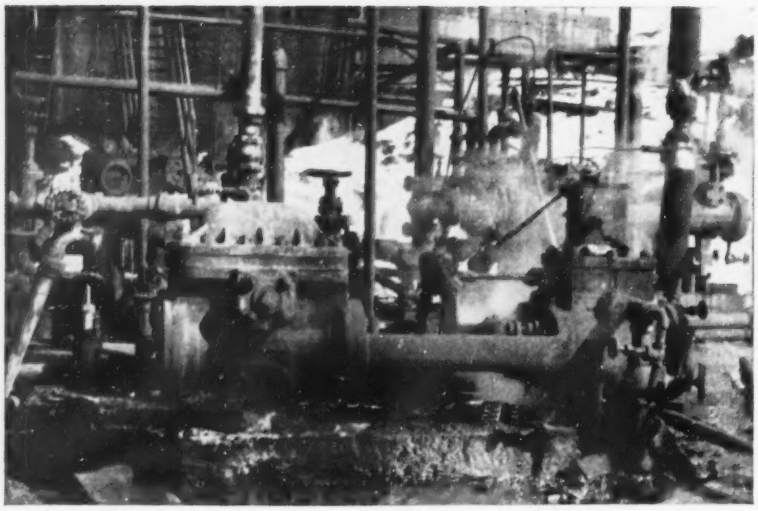
Open, enclosed, splash proof, fan-cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 432 to 1 ratio . . . with electric brakes . . . with mechanical variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best motor drive for YOU.

Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor driven products . . . improve the economy and productivity of your plant equipment.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER GEARMOTORS





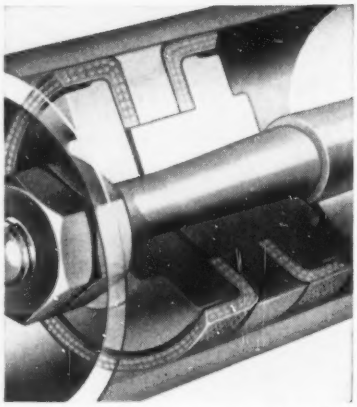
"CHAMBER OF HORRORS"

—for anything but a DARCOVA PUMCUP!

"HOW tough can life get", says ordinary packing inside this pump. Yet, year after year this pump is required to handle acid treated oil products from the base of a heated still to the next purifying process.

Ordinary packing would soon allow slippage to occur—but not Darcova Pumcups. Pumcups retain their efficiency even when severely worn. This installation has operated efficiently for over eight years.

No matter how tough your pumping problem may be, you can do it more efficiently and for lower cost with Darcova Pumcups!



Cross section showing Pumcup installed.

Write for free bulletin No. 4401 on how Pumcups can help solve your pumping problems!

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 20, PA.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

Removing Fruit Mold

—*Continued from page 87*

A concentrated solution of detergent is continuously fed by gravity into the soaker washer through a small hose attached to an overhead tank. To avoid reduction in flow rate, the tank should be located as high above the washer as possible. Variations of 0.1 to 0.2 percent in the concentration of the detergent is permissible, since the tests did not indicate any significant sensitivity to such changes as regards performance in mold removal.

If it is not convenient to elevate the tank, a small, low-head centrifugal pump may be used to feed the detergent into the washer. Flow of the solution can be regulated by installing a small globe valve or employing a laboratory-style compression clamp with flexible tubing.

The following formula can be used for determining the amount of detergent going into the flow:

Flow of solution equals: Flow of water (lb. per min.) x concentration of wash water (percent) divided by concentration of detergent concentrate (percent).

Thus assume that the rate of water flow is 83.4 per min. to each of three washers. The combined flow is then 250 lb., or about 30 gal. per min.

Also assume that a 30 percent solution of Santomerse is to dilute 250 lb. of water to a concentration of 0.1 percent. The equation then becomes—

Flow of solution equals: 250 x 0.1 divided by 30, equals 0.833 lb. of detergent concentrate per minute.

In an 8-hr. shift, about 45 gal. of Santomerse would be used.

Since the detergent is in liquid form, it can be fed directly from the drums in which it is shipped, without the need of supply tanks or agitators.

End (Resume reading on page 88)

Potato Dehydrating

—*Continued from page 91*

describe this change in visual appearence include "wrinkled," "angularized," "shrunken," and "crystallized."

Rates of freezing are recorded in Fig. 1. Moisture contents of the several varieties after freeze, thaw, and press, and time of holding between various assumed effective temperatures ranges are recorded in our accompanying table. Moisture content used in establishing the equation was the average remaining in the three varieties of granules after pressing.

Since actual temperatures at which freezing started and was completed

Satisfaction rests on the carton

The finer your product, the more it deserves a good shipping container.

Every week, thousands of dealers receive famous Oscar Mayer & Co. products in UNION Corrugated Containers.

Union board and boxes are among the strongest made. They give dependable protection.

UNION
TWIN INTEGRATION
INTEGRATED PLANNING
INTEGRATED PRODUCTION

UNION

BAG & PAPER CORPORATION

CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
Western Division Sales Offices: 4545 West Palmer, Chicago 39, Ill. • Executive Offices: Woolworth Bldg., New York 7, N. Y.

For more information, use coupon on page 157.

Exposes foreign matter and residue! Resists oils, acids, alkalies!

Globe White Neoprene Rubber Belting installed on leading make conveyor.

EXPOSED: Dust, dirt and other accumulations! Product particles that are left behind!

The snowy whiteness of Globe White Neoprene Belting exposes them all to certain detection, enabling immediate elimination with hot water or live steam. *That's sanitation-plus!*

Known as the do-all conveyor belting of the food industry, for which it was specifically developed, Globe White Neoprene Rubber Belting consists of multiple layers of hard-woven, light duck, molded together with highest grade neoprene rubber between the plies and over the entire surface . . . finished with a 3/64″ thick, satin-smooth cover on the carrying side and with a friction surface on the pulley side.

The characteristics of this type of construction are unmatched: Exceptional flexibility; high tensile strength; minimum stretch . . . all extremely advantageous in operations where head and tail pulleys are small, and on machines with limited take-up facilities.

Resistant to oil, grease, acids, alkalies — possessing a satiny smoothness that makes no impression whatsoever on the product conveyed, Globe White Neoprene Rubber Belting is today on the "must" list of numerous food processing and handling concerns.

Standard widths up to 48″, in 2-6 plies inclusive, are available. When inquiring, ask also about Globe White Ruff Top Neoprene Incline Belting, Globe Brown Neoprene Belting, with friction surface on both sides, and Globe Brown Kling-Top Neoprene Belting, with non-slip top for incline and decline conveyors.

Write Dept. F11 for free samples, literature and the names of your local distributors.

GLOBE

WOVEN BELTING CO., INC.
KNOWN FOR QUALITY THE WORLD OVER

1400 CLINTON ST., BUFFALO 6, N. Y.

were not known, it was assumed that freezing started at, or slightly below, 32 deg. F. At 29–28 deg., potatoes appeared to be completely frozen; they were hard, and they shattered like ice when struck with a hammer. Assumed effective temperatures and corresponding time intervals are recorded in the table.

Results of the work are shown in Fig. 2, where percent moisture (on wet basis) remaining in granules after pressing is expressed as a function of freezing time over the indicated ranges. Since results obtained for the assumed effective freezing range 31–29 deg. F. gave the nearest straight line, this was taken as the truest freezing range of those considered. The equation for this line is:

$$Y = -5.6 \log_{10} X + 71.7$$

where Y = percent moisture in pressed potatoes (wet basis), and
X = length of freezing time in minutes.

It is apparent that this is an approximate equation only. But it specifically demonstrates that the slower freezing results in a dryer pressed cake. It will serve a useful role in making rough cost, design, and operational estimations.

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End (Resume reading on page 92)

Tames Wild Rice

—Continued from page 94

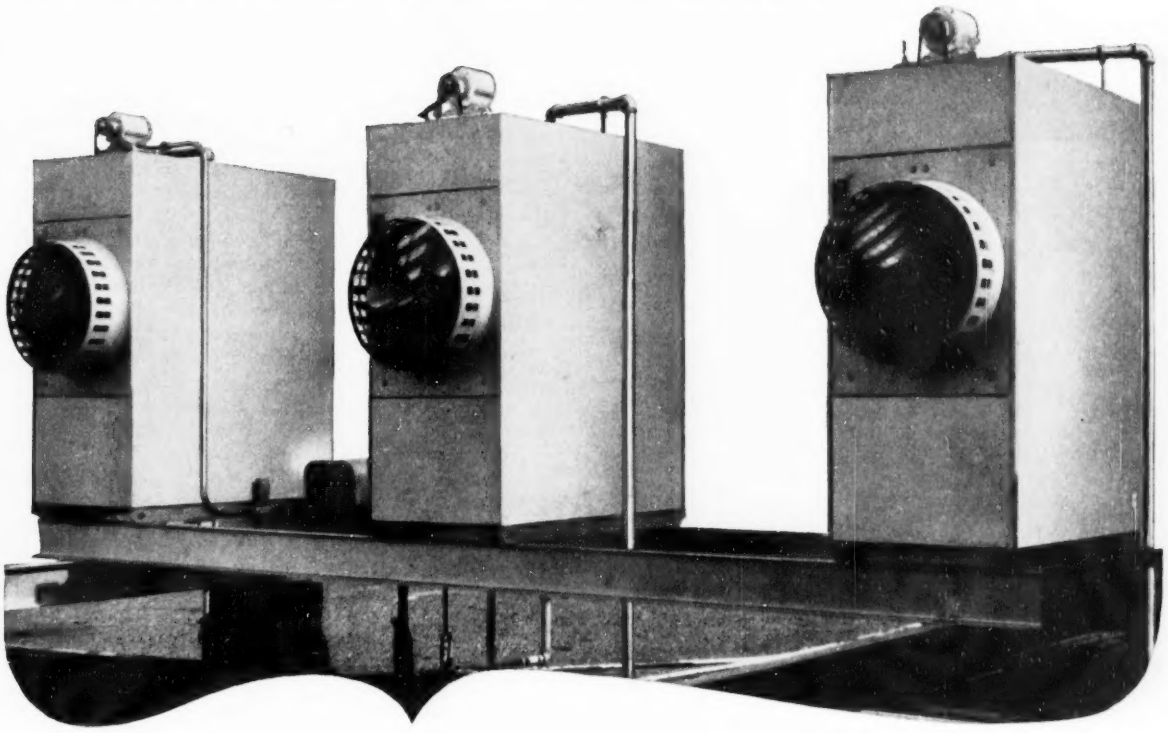
and allowed to air dry for three or four days.

Next the grain is moved over to the parching building, where 100 lb. batches are loaded into two metal, wood-fired parching tumblers. Each unit is about 10 ft. long, has a central rotating motor driven spiral agitator to toss the grain, and receives its heat from burning tamarack logs, fired in an oven below.

Parching which takes about 40 min., is terminated when the operator "feels" that the kernel has enough brittleness to easily separate from its sheath.

Parched grain is allowed to cool slightly in a roller-borne mobile

MARLEY AQUATOWERS...



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With the increasing popularity of "zone cooling," multiple installations of Marley Aquatowers appear on more and more buildings. This system of cooling individual areas with separate systems offers true flexibility of operation: no complete shutdowns for maintenance; varying schedules of operation with consequence power and water economy.

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after 5 years' service
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wooden bin and then is delivered to the loft and piled for a day's "sweating". This slightly tempers the grain so that subsequent thrashing will not crack the kernel.

A gravity-feed hopper then delivers the grain into a metal drum driven by a six-cylinder engine and equipped with internal wooden and rubber arms that pulverize the hulls. This unit handles a 20 lb. batch every few minutes. The parching unit was designed by Holbert. Both units are especially suited for wild rice.

After thrashing, the grain is fed into a conventional fanning mill that separates it from the chaff. The parching and winnowing process causes a weight loss of about 60 percent. Clean product is then bagged into 100 lb. units—worth as much as $200 each—and delivered to the packaging plant in Onamia.

Attractive, distinctively labeled rectangular cardboard cartons are used. These come in 4, 9, 12, and 16 oz. sizes.

A few years ago Sherman Holbert developed a system for grading wild rice according to size and freedom from broken grain and foreign matter. Four sizes are listed—supreme, jumbo, table, and petite. And quality can be fancy, select, standard, and service. A color grading has also been set up.

While dry wild rice is avidly sought after and eagerly used by epicures, its tedious preparation has been a hindrance to time-pressed members of the cooking fraternity. It requires a low temperature soaking for hours before it can be cooked.

To avert this, Holbert has come up with a pre-cooked canned wild rice that simply has to be heated prior to use.

Briefly, the grain is mass soaked in tepid water until fluffy and then packed and sealed in No. 2 cans. These are then retort-cooked, resulting in an excellent waste-free wild rice that will adequately serve four per can.

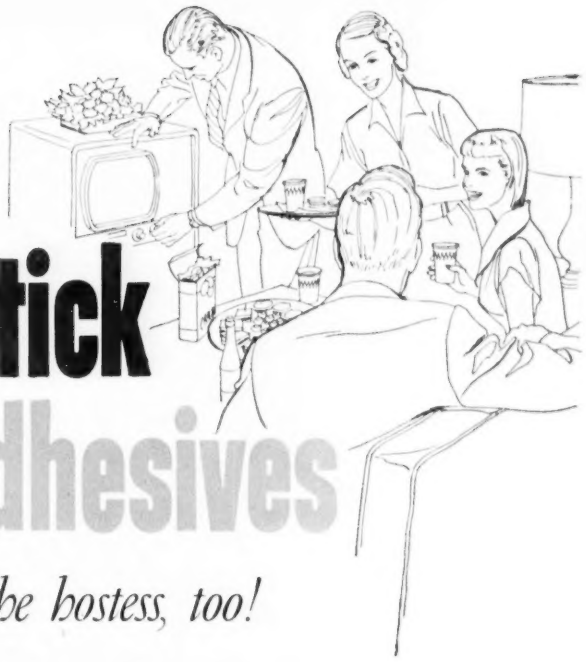
End *(Resume reading on page 95)*

Integrate Operation

—Continued from page 86

off of oil flow to furnace, ring an alarm, and actuate a signal light at the main control panel. This is carried out by thermocouples (each tower has one mounted near the top). A 'couple will energize a relay cutting off the oil if the temperature rises above safe operating levels. The same action is taken if any of the blower motors fail, mechanically or electrically.

In addition, a high-limit flame-failure unit is fitted at the furnace end to



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They serve you and the hostess, too!

As in other fields, Swift's Adhesives are used by many of the manufacturers who produce for the millions and millions of America's housewives—at work and at play. Swift's varied line includes adhesives for fabricating and sealing food and candy packages . . . for labeling bottles and jars . . . for these applications and many more.

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close the quick-shutting oil solenoid valve in an emergency. Excessive furnace temperatures or failure of the burner flame (registering through a photoelectric cell) will do the trick. Finally, failure of the blower furnishing burner air actuates a pressure switch in the duct to the burner, also shutting off the oil.

Electrically Sound

Power for this plant is derived from a metered primary circuit 8,320v. "Y" to a bank of three 250 kva. transformers. A multiple circuit of two 750 mcm. (thousand circular mils) conductors per phase carries the power at 480v. 3-phase, delta, from this substation underground to the 1,200 amp. main breaker on the operating platform of the dryer installation.

The three large blower motors are started in sequence with a time delay relay, preventing simultaneous starting of more than one at a time. And electrical interlocks prevent operation of the burners until the respective blowers have first been activated on the line.

There are two control stations—one on the operating platform and one on the ground level. The one at ground level permits stopping and starting of all the motors between the peel dump and the elevator to the dryers. The presses are interlocked with the dryer elevator in such a way that neither can be operated unless this elevator is first energized.

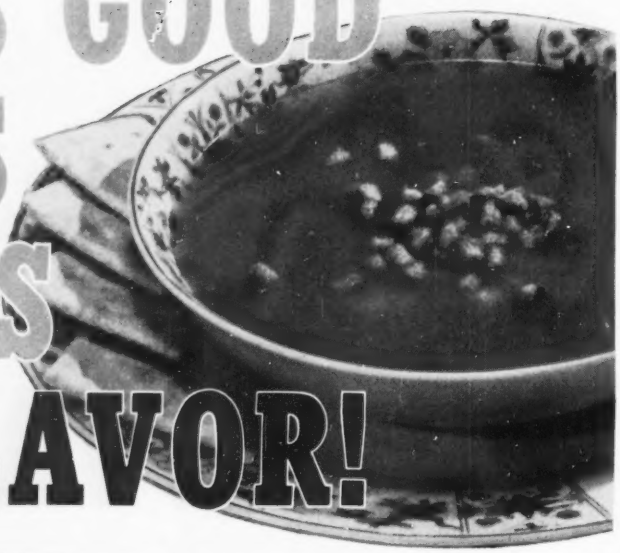
The delay screw starts a second interlocked group which is connected back to the peel dump. This interlock minimizes the likelihood of material jamming in the conveyors due to any one conveyor motor starter tripping out (due to overload or other reasons). The shredders are interlocked so that either one or both can be operated to complete the circuit energizing the shredder elevator.

The pushbutton station on the operating platform permits control of the dryer blowers as well as all the conveying equipment to and from the dryers. Many of these motors are operated in groups to eliminate unnecessary pushbutton stations and control wiring.

Where a group of several starters is controlled by a single pushbutton, control circuits have been arranged so that all the overload relay contacts of a given group are in series. Thus, if any one starter in the group trips due to overload, it will automatically stop all the other motors in that group, as well as any conveying equipment feeding that group by virtue of the interlocking.

End (Resume reading on page 87)

IT'S ONLY AS GOOD AS ITS FLAVOR!



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March 1953

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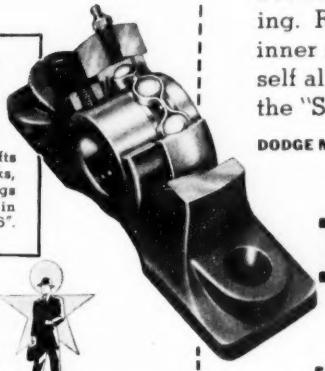

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Q. *What is Roche vitamin A?*

A. It is vitamin A, the product of a synthesis which starts with Citral, from lemon grass oil. It is identical biologically with the vitamin A from other sources, such as fish livers. A Roche research team directed by Dr. Otto Isler announced their famous synthesis in 1947. This successful, economical process is now used to produce vitamin A of superb quality by the tons at Roche Park.

Q. *Does Roche vitamin A have a "fishy" odor or taste?*

A. None whatever, nor is there any "fishy burp." In fact, Roche vitamin A has almost no odor or taste and so is preferred for processed foods such as margarine.

Q. *Will I be able to get a steady supply of Roche vitamin A?*

A. You will. The entire commercial needs of the food and pharmaceutical industries of the United States and Canada could be met from our Nutley plant.

Q. *Can I be sure of a "standard" product?*

A. You can. Roche vitamin A is manufactured under strict laboratory control. It is more stable. It is uniform. The regular commercial types of Roche material, if diluted to 50,000 to 65,000 units per gram, will meet the specifications of U.S.P. XIV for oleovitamin A. It is a product of excellent quality.

Q. *What about price?*

A. Roche vitamin A is not subject to wide fluctuation of price, as has been true with vitamin A from natural sources. This can mean large savings for you as there is no need to carry large inventories as was the case prior to the introduction of Roche vitamin A in 1950. Never before has the purchaser been assured of such low prices, consistent with quality and uniformity.

Q. *How is Roche vitamin A packed?*

A. All Roche vitamin A is packed under conditions which assure its stability in customary shipment and storage.

Q. *Can I get help from Roche in using vitamin A in my products?*

A. Yes, certainly! Roche technical experts who supplied so much data at the hearings for amended Definitions and Standards of Identity for Margarine are always at your service. It is important to you that Roche specializes in the manufacture of vitamins.

Q. *Is Roche vitamin A available in different types and potencies?*

A. It is. The following table shows the types most popular in food manufacturing.

TYPE	DESCRIPTION	POTENCY	ADDITIVE*
P1MO	Vitamin A palmitate	1,000,000 U.S.P. XIV units per gram	Edible oil only for standardization
P1.3	Vitamin A palmitate	Ranging between 1,250,000 and 1,500,000 U.S.P. XIV units per gram	None
A1MO	Vitamin A acetate	1,000,000 U.S.P. XIV units per gram	Edible oil only for standardization

*Antioxidants or other additives are included on customer's specifications.

Notes: Type P1MO has less tendency to crystallize during storage and handling than higher concentrations of vitamin A palmitate and acetate.

Type P1.3 is more susceptible to crystallization than type P1MO but can be handled without difficulty when using certain precautions.

Q. *Are special blends available for the margarine industry?*

A. Yes. Roche will supply blends to your specifications. A modern blending and canning plant is at your service.

Q. *What kind of service can I expect on special blends?*

A. The best—with special attention to accuracy, quality and control.

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286 St. Paul Street, West, Montreal, Quebec

ADVANCES IN TECHNOLOGY

Many Factors Contribute to Flavor of Bread

Three broad groups—ingredients, fermentation, and baking—are responsible for flavor of bread.

Well milled flour from sound wheat contributes its mild flavor; starch and enzymes in flour and action of saliva are largely responsible for sweetness, salt helps develop qualities.

Yeast, by itself, contributes little unless added in excess, and the resulting yeasty flavor is not desirable. Sugar, milk, malt, germ, and fats may possibly influence flavor, but they are generally used in such small amounts that effect is minor.

Fermentation of dough is required to obtain a desired flavor in bread, as is also browning reaction. Experiments have demonstrated that sugar is source of flavors obtained both by fermentation and browning. But sugars will not brown appreciably at temperature reached in crust during baking. It takes nitrogen from amino acids to make the browning reaction possible. Some of these acids are reduced to alcohol by fermentation, and to an aldehyde by browning. Both products carry potent odors and flavors.

Mixing also has an effect on browning and flavor. If doughs made from identical formulas are under-, properly-, or overmixed, crust of resulting bread will progress from a light, underbrown, grayish color to a full, deep brown. A corresponding change in flavor is noted. That of the undermixed sample resembles flour or raw dough, while that of the overmixed one is rich, full, and appealing.

This effect may be associated with unfolding of protein micelle during mixing to expose active amino groups which take part in browning with release of flavor.

Volatile aldehydes are also responsible for crusty flavor carried into bread crumb, and amount and speed of baking influence quantities of volatiles retained.

Volatiles and flavor arising from fermentation reactions can be increased by longer sponge time, more yeast, ample sugar. Stronger flours may offset deleterious effect of more extensive fermentation in sponge upon loaf volume and crumb properties.

The sooner bread is wrapped after baking, the greater the retention of volatiles and in cooling, evaporation should be avoided as much as possible.

Digest from "Flavor of Bread," by J. C. Baker, H. K. Parker, and K. L. Fortmann, *Cereal Chemistry*, 22-30, Jan. 1953.

Baking In Closed Receptacle Cuts Time, Improves Product

Using covered containers and applying heat predominantly to top thereof, comprise novel features of a patented method of baking bread and cakes.

In process, dough is placed in pan with close fitting lid which is then inserted in oven with heat sources directly under and over. When these are energized, bottom of pan is gradually warmed while top is subjected to intense radiant heat.

This heating causes gradual evolution of steam which is confined within pan except when pressure becomes sufficient to raise lid. After a time, steaming stops and intense heat browns surface of loaf.

It is claimed that, in moist atmosphere, dough rises very uniformly and rapidly, and that intense heat results in an evenly browned loaf of fine texture, consistency and appearance. It is further claimed that time of baking is reduced approximately 50 percent.

Digest from U. S. Patent 2,621,616, issued Dec. 16, 1952, on application dated July 19, 1946, to Butler Ames, Boston, Mass.

FATS & OILS

Better Shortening With Triacetin

Improvement of working range of temperature of a plastic shortening can be accomplished by appropriately introducing acetyl groups into molecular structure of base stock.

According to a recently patented process, such a plastic shortening will also keep better in storage, and will show improved resistance to the effects of heat. It will exhibit better texture stability, improved creaming properties, and will form less gum and foam in frying.

Acetyl groups may be introduced, and acyl groups rearranged by mixing triacetin with high molecular edible fat triglycerides and intimately contacting with catalyst.

Catalyst is either removed or inactivated, and unreacted triacetin is removed in order to raise the smoke point which otherwise would be objectionally low. To this substantially triacetin-free, acetyl-containing base stock, hard stock may be added if desired. Mixture is then plasticized in usual manner.

Digest from U. S. Patent 2,614,937, issued Oct. 21, 1952, on an application dated May 28, 1949, to F. J. Baur, Wyoming, and Willy Lange, Cincinnati, Ohio, assigned to The Procter & Gamble Co., Cincinnati.

Fat Rendering Process

Crux of patented process for rendering fats is preliminary removal of chemically uncombined water by cold distillation, and comminution of dried cold fat before rendering.

Raw fat is suspended in separate pieces in mechanically refrigerated chamber at 32-40 F., to remove moisture and congeal material. Comminution operation may be effected in any manner.

Fat is then placed in agitator equipped heated vessel. Temperature of vessel will vary with different fats, but must be above liquefaction point. Violent agitation is maintained throughout heating period, following which mass is separated by straining or other desirable method. Cellular tissue residue has high nutritional value and can be used in various foods

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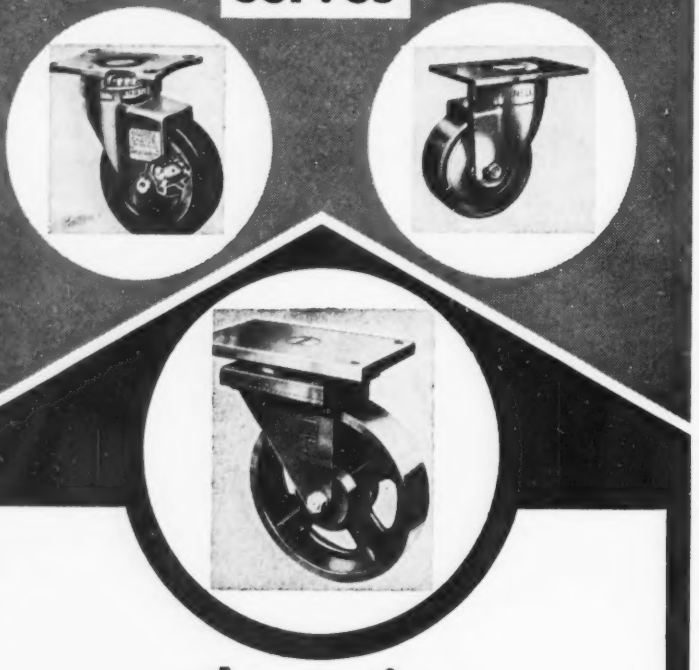

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or feeds. Operating time is reported to be 5-10 min., compared with several hours by commonly employed methods.

Digest from U. S. Patent 2,616,910, issued Nov. 4, 1952, on application dated March 10, 1949, to Charles Pavia, New Market, Va., assigned to Pavia Process, Inc., Washington, D. C.

Purification of Glycol For Use In Coconut

Treatment of coconut with propylene or butylene glycol yields product that retains enough moisture to be tender, and can be marketed in low-cost containers without danger of microbiological spoilage. Unless glycols are freed from carbonyl-containing impurities, however, product will turn yellow on 2-3 months' storage at room temperature. It is to purification of the glycols that a recently patented process gives particular attention.

Several methods are available. Fractional distillation under reduced pressure is a satisfactory procedure. Treatment with strong nonvolatile alkali at high temperature, followed by distillation will also remove impurities. Or SO_2 may be bubbled through glycol until desired concentration is reached. This method does not remove carbonyl-containing impurities, but inactivates them. Other purification methods are: Ion exchange, and adsorption with anhydrous alumina.

Digest from U. S. Patent 2,615,812, issued Oct. 28, 1952, on application dated Oct. 12, 1950, to C. W. Kaufman, Tenafly, and C. B. de Maya, Allendale, N. J., assigned to General Foods Corp., New York.

MEATS & FISH

Free Sugars In Muscle Cause Fish To Brown

Browning of certain white-fleshed fish during heating under conditions similar to those arising during normal canning procedures has been traced to ribose in fish muscle. And only those fish whose muscle contains significant amounts of this sugar discolor extensively on canning.

Using filter paper chromatography to ascertain presence of free ribose, and spectrophotometry to determine degree of browning following retorting, relationships between the two were worked out. Fish with higher free ribose content tended to brown more markedly on heating than those with low sugars.

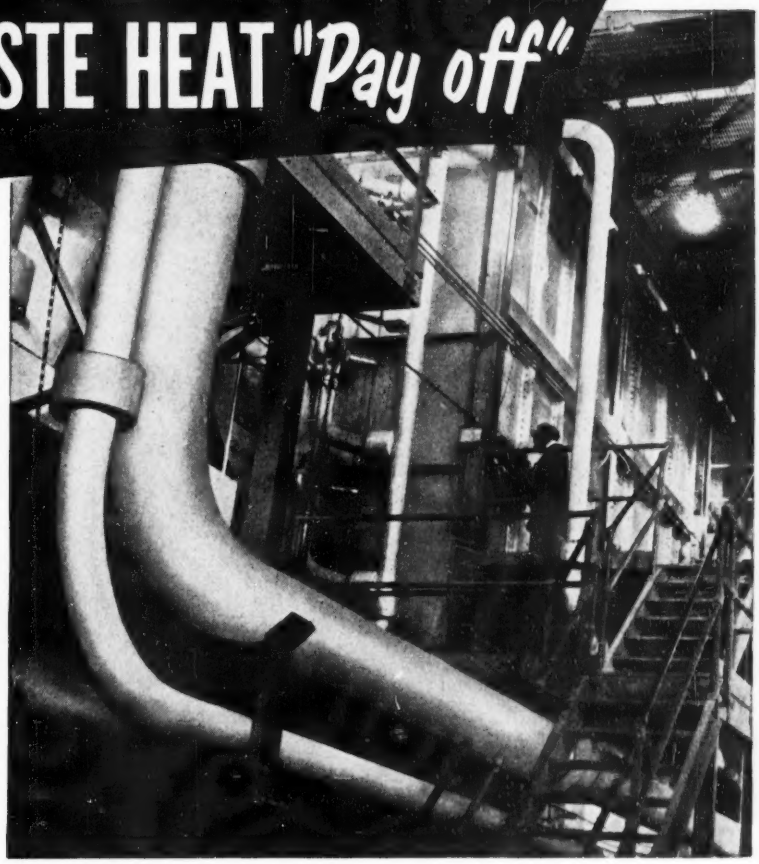
Methods of elimination of free ribose in fish muscle are being sought.

Digest from "Cause of the Browning of Certain Heat-Processed Fish Products," by H. L. A. Tarr, *Progress Report No. 92 of the Pacific Coast Stations*, Vancouver 2, B. C. 23-24, Oct. 1952.

MAKING WASTE HEAT "Pay off"

with

the help of K&M insulations



One of the East's large cement companies gets all the electric power it needs for plant operation by utilizing the waste heat from its cement kilns. This heat is first directed to a boiler which produces a continuous supply of 700°F. steam. This, in turn, is piped to a power-generating turbine—and that's where K&M insulations come in!

So that heat loss is held to a minimum, two effective K&M insulations have been used in combination on the main steam header: a 1½" layer of "Featherweight" 85% Magnesia over a 1½" layer of Hy-Temp insulation. For two smaller boiler-feed water lines, a 1½" layer of "Featherweight" 85% Magnesia is sufficient. All pipes have been finished with a canvas jacket and painted.

K&M "Featherweight" 85% Magnesia is a versatile, dependable, economical insulation for applications up to 600°F. Combined with Hy-Temp, it is efficient on installations having temperatures up to 1900°F. Both materials are supplied in a wide variety of forms and thicknesses.

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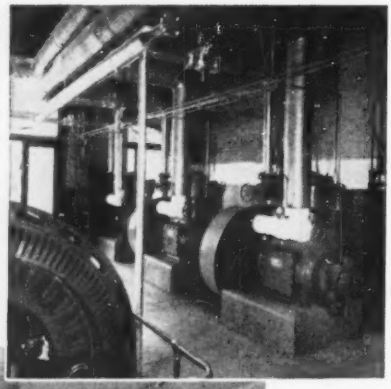

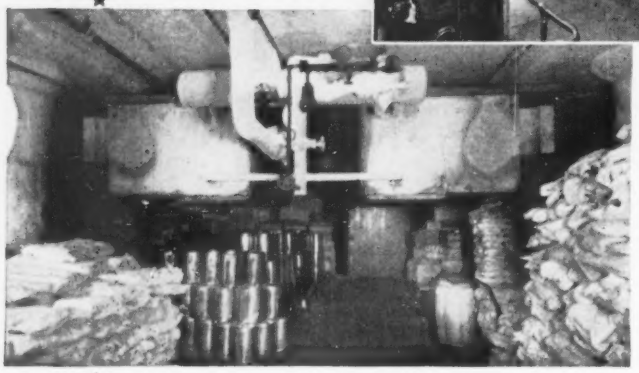

So great has been the demand for sharp freeze and 0° storage facilities, Merchants Ice and Cold Storage Company has now converted 9 of its 14 floors from cooler storage to low temperatures. Naturally, Vilter refrigeration has played an important part in the conversion.

A third Vilter Blast Freezer has recently joined the first two, installed in 1948. Vertical Vilter booster compressors handle the enormous load, and Vilter ceiling-suspended air units help save space and save money in the 0° storage rooms.

Vilter users know that they get more than just efficient, economical refrigeration when they buy Vilter. They get equipment that often speeds processes, that may reduce handling, that can save valuable space. And they get equipment that costs less to run—less to keep up. That's why more and more plants are specifying Vilter.

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Skinless Cooked Sausages By Continuous Process

Special apparatus has been designed and patented for continuous, automatic production of skinless, partly cooked, sausage products.

In operation, machine extrudes sausage mix into flexible tubular mold which is fed on a belt conveyor. Mounted on conveyor is a series of suitably spaced, pincher-like devices that grip mold and divide the sausage meat into individual links.

Pincers then move links into electric heater where high-frequency alternating current uniformly cooks sausage and coagulates protein of meat causing it to retain desired shape after tubular casing is removed. This is accomplished by means of a plow that splits casing and allows it to be wound away from the sausage as latter passes from cooker to smoke oven or other processing equipment.

Digest from U. S. Patent 2,623,451, issued Dec. 30, 1952, on an application dated Sept. 11, 1948, to J. J. Prohaska, La Grange, Ill., assigned to Swift & Co., Chicago.

DAIRY

Antibiotics Inhibit Starters

Butter and cheese cultures are readily inhibited by penicillin, streptomycin, or mixtures of them, and by aureomycin and tyrothricin. These and other inhibitors can get into a milk supply as result of antibiotic therapy of bovine mastitis, or even through unscrupulous producers who might wish to prevent souring.

Penicillin concentration of 0.1 unit per ml., streptomycin at 0.1 mg. per ml. inhibited metabolism and lactic acid development sufficiently to prevent use of the starters for manufacture of cultured products.

Aureomycin had a similar effect at 0.10 mcgm. per ml. and tyrothricin at 0.1 mg. per ml. According to results obtained in tests, 75,000 units penicillin would inhibit lactic acid formation in about 200 gal. of milk.

Digest from "Antibiotics and Lactic Acid Starter Cultures," by E. J. Stoltz and D. J. Hankinson, *Journal of Applied Microbiology*, Vol. 1, 24-29, Jan. 1953.

Evaporated Milk Keeps Best When Stored at 40 Deg. F.

Losses of nutritive value which occur in evaporated milk during prolonged storage at high temperatures are appreciable, but not as striking as changes in palatability and appearance.

An investigation, undertaken to confirm suggestions that storage losses of amino acids might be minimized by cold storage and accelerated by high

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Four times as many milk cans are scoured inside, at 20% lower brush cost, and the life of the cans prolonged — since one dairy had a special power brush built of Fullergript... the brush strip with brush material anchored in a metal channel.

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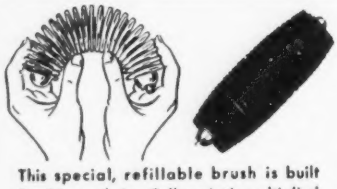
ROUND OR SQUARE TUBES, PIPE AND CHUTES CLEANED AT LOWER COST WITH *Fullergript*

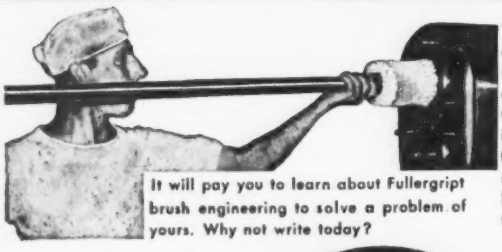
Brush life is doubled for dairies that clean tubes with this special Fullergript power brush, which can be reversed on the core for extra life. Another saving: only the coiled brush strip is replaced; the husky brass core is permanent.

300% saving in labor cost is achieved with this Fullergript angel cake pan cleaning brush. (The cut-out view, shown below at the left, lets you see how this brush fits into a pan). With this brush mounted on a motor driven driveshaft, one man can clean as many pans as three men could by hand. That's why you will find this Fullergript angel cake pan cleaning brush used in more than 500 bakeries in the United States.

This square brush rides the chain in a flour elevator leg, to reach into corners, and remove weevil-breeding flour accumulations. A good example of Fullergript design versatility.



This special, refillable brush is built flexible, to bring Fullergript's multiplied cleaning action inside of beer lines.



This special brush for the freezing cylinders of ice cream machines will last eighteen months (instead of one month) but more important, it assures positive removal of incipient casein deposits — in just five to ten strokes. Fullergript strip, with channel-anchored brush material, makes possible this augmented scouring action.

It will pay you to learn about Fullergript brush engineering to solve a problem of yours. Why not write today?

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temperatures, has now revealed the following facts:

After 2 yr. at 100 F. the product was not acceptable as food and had lost large amounts of tryptophane, lysine, histidine, and arginine.

That stored at 40 F. retained all of the amino acids after 2 yr., and its appearance was similar to recently processed evaporated milk.

Digest from "The Role of Temperature in Amino Acid Losses During the Prolonged Storage of Evaporated Milk," by A. Z. Hodson, *Food Research*, 467-71, Nov.-Dec. 1952.

CONFECTIONERY

Dried Honey-Milk

A dried product comprising a mixture of honey with at least one amorphous lactose-containing milk product is the object of a recently patented invention.

In process, a mixture of honey (10-70 percent) and milk solids (90-30 percent) is held at 50-110 F. until water in the honey combines with lactose and dextrose present to form crystalline hydrates. Resulting product is said to be firm, non-viscous, and non-adherent. Possible milk products are dried whole, skim, buttermilk, or whey.

Digest from U. S. Patent 2,621,128, issued Dec. 9, 1952, on an application dated April 21, 1950, to B. H. Webb, Kensington, Md., and G. P. Walton, Washington, assigned to United States of America.

Improved Chocolate Melter

Main object of apparatus recently patented for treating pasty materials is to break up stratified layers that never become intermixed. Condition is emphasized when products are subjected to thermal conditioning by circulating hot liquid in a jacketed tank. Under such conditions, material near tank sides and bottom increases in consistency and tends to stick to walls of vessel.

In accordance with invention, movable harness of stirring mechanism is provided with scrapers acting, not only on side walls of the tank, but also on the bottom. These move materials to the field of stirrer action that otherwise would remain unmixed. Furthermore, bottom scrapers may be arranged to impart markedly ascending motion to products, thus mixing it with stratified material above. Finally, direction of scraper action can be inverted, thereby working material in both directions, and alternatively in one direction and another in any desired cadence.

Favorable result obtained by reversing direction of mixing is due to eddies formed in the mass, thus break-

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4. Raw juice is thus economically pre-heated before entering the final heater section.

One FULSCOPE Controller records and controls product temperature at final heater outlet and simultaneously records temperature of the heating medium. The other FULSCOPE controls and records the temperature of the juice at the regenerator outlet by means of the control valve in the raw juice by-pass. The second and third pens of this instrument record the temperature of the juice in the holding line and also the temperature of the raw juice.

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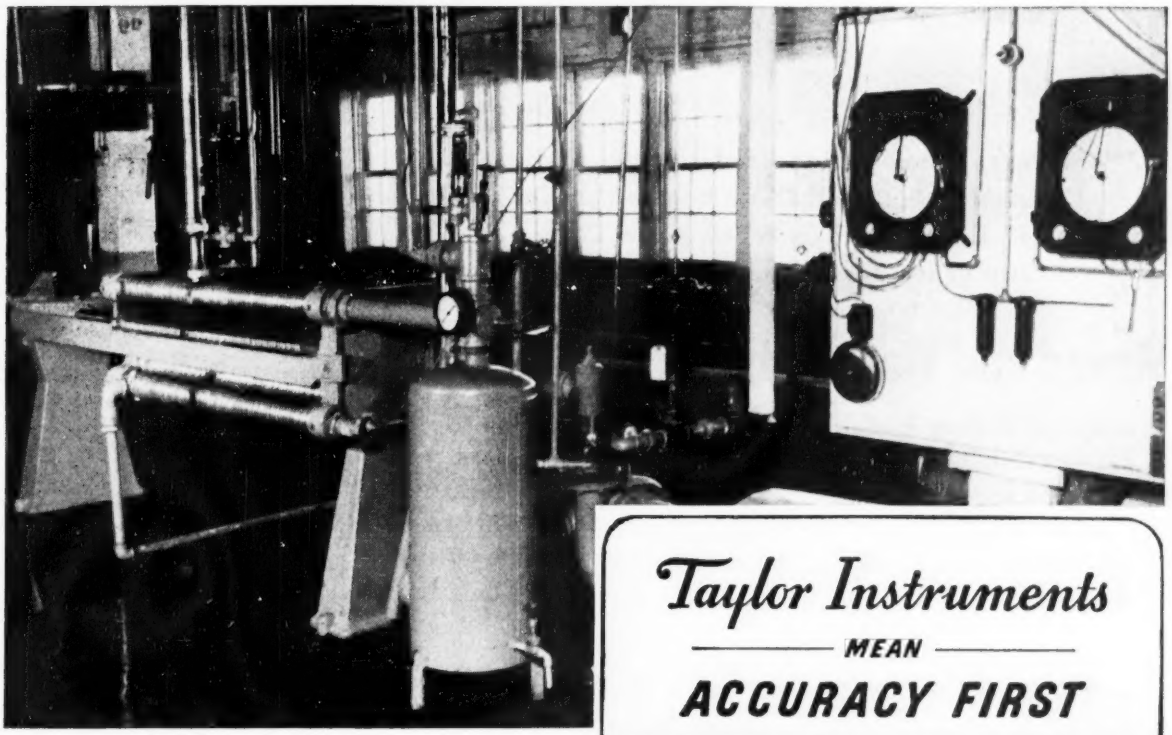

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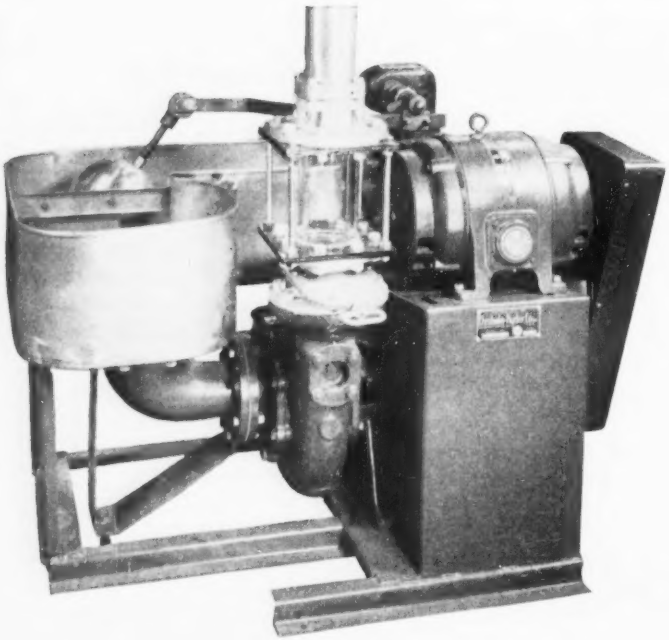

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306

ing up stratified formation. Net result is improved trituration of mass and a higher degree of homogenization.

Digest from U. S. Patent 2,622,856, issued Dec. 23, 1952, on an application dated Sept. 6, 1949, to André Simon, Namur, Belgium.

BEVERAGES

Sterile Coffee Concentrate

Preserved coffee beverage which contains more of unoxidized aroma and flavor than has previously prevailed is object of a recently patented invention.

In process, fresh roasted whole bean, or very coarsely ground coffee, is placed in a container which is immediately filled with boiling water, sealed and held for approximately 30 min. before cooling.

Container may be a tin can coated to prevent reaction between tannic acid of coffee and iron of can, a heat-resistant glass jar, or a flexible, moistureproof bag. Resulting beverage may be single strength or concentrate, and may contain added sugar, dry milk, butter, vegetable fat, or gelatin.

Digest from U. S. Patent 2,620,276, issued Dec. 2, 1952, on an application dated March 2, 1949, to W. A. Heyman, Lawrence, N. Y.

Electrochemical Method For Oxygen In Beer

Oxygen determinations in beer or other liquids, including those undergoing fermentation, can be readily made with an electrolytic cell through which the liquid flows.

The cell contains a noble metal cathode (Pt, Au, or Ni) and a base metal anode (Pb, Zn, or Fe). A microammeter with multiplying shunts and a short circuiting switch is used for measurements, which are accurate functions of oxygen content of liquid as long as there are no electrode reactions taking place other than reduction of oxygen to water. Oxygen content of the liquid is obtained from a curve or table showing mcgm. of O_2/l. for microampere readings.

Cell and instrument are calibrated by circulating acetate buffers of pH 4.6 and differing O_2 contents, and simultaneously making readings and determining O_2 by the Winkler method.

With the instrument it is readily established that O_2 in wort falls to zero during fermentation, rate of fall varying with the strain of yeast. Transfer of beer by pumps increases O_2 content, and filtration usually does likewise. Long storage reduces it as beer constituents are oxidized.

Beers in storage will contain 5-10

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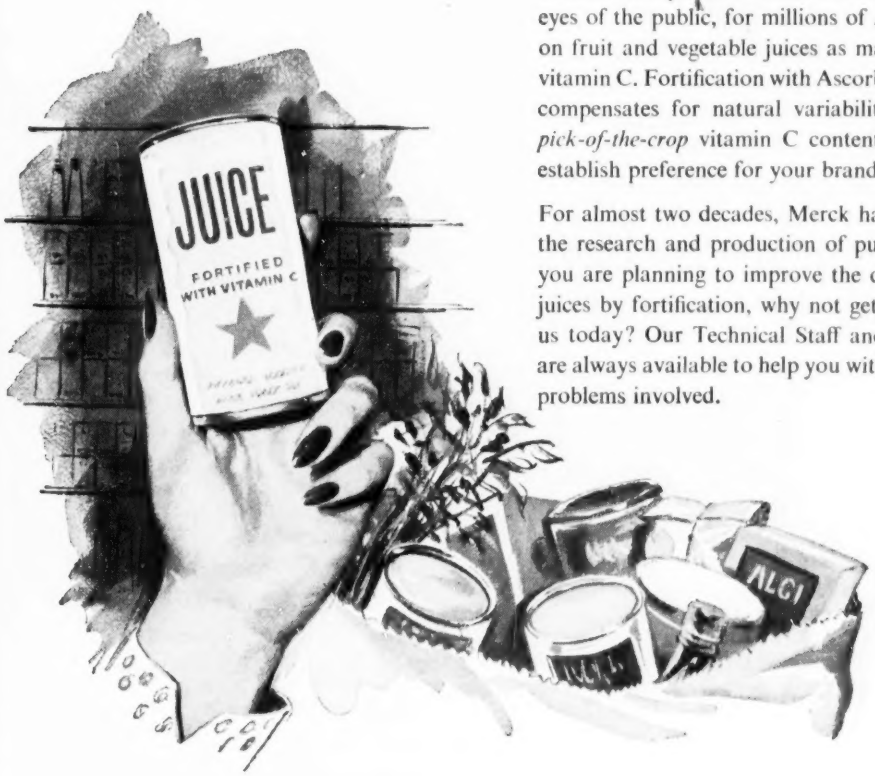

Fortification possesses definite sales appeal in the eyes of the public, for millions of Americans rely on fruit and vegetable juices as major sources of vitamin C. Fortification with Ascorbic Acid Merck compensates for natural variability and assures *pick-of-the-crop* vitamin C content, thus helping establish preference for your brand.

For almost two decades, Merck has pioneered in the research and production of pure vitamins. If you are planning to improve the quality of your juices by fortification, why not get in touch with us today? Our Technical Staff and Laboratories are always available to help you with any technical problems involved.

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Cross-section shows FURNANE Food Plant Floor on concrete slab with membrane. Installation shown is in meat packing plant.

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mcgm. O_2/l; freshly fermented beers may have 100-200 mcgm.

Digest from "New Developments with Electrochemical Oxygen Determination in Brewing Plants," by F. Tödt, G. Woldt, and R. Koch, *Die Brauerei, Wissenschaftliche Beilage*, Vol. 5, No. 9, 87-90, Sept. 1952.

CEREAL PRODUCTS

Canned Pre-Cooked Rice

Process for pre-cooking and canning rice which gives a stable ready-to-eat product of good color that retains its granular form has been patented.

The rice is dry-cleaned and rinsed in detergent solution to remove loose starch and glutinous materials and disinfect the grains. This is followed by rinsing in clean, cool water, soaking in cool water, and boiling 2-5 min. in a large volume of water which is then salted. Following boiling in saline solution for 2-5 min., rice is drained and canned.

Small quantity of acid solution is added to each container followed by sealing and sterilizing by retorting.

Digest from U. S. Patent 2,616,810, issued Nov. 4, 1952, on an application dated Jan. 25, 1951, to N. B. Gallenkamp, Houston, Tex.

FRUITS & VEGETABLES

Corn Fritter Batter

Preparation of a ready mixed frozen batter that contains all necessary ingredients for making tasty corn fritters is the object of a recently patented invention.

Caps of kernels of thoroughly cleaned, but not blanched, matured sweet corn are opened by rubbing the cob over a grater or similar instrument. This is followed by scraping to remove pulp and germ, leaving hulls intact on cob.

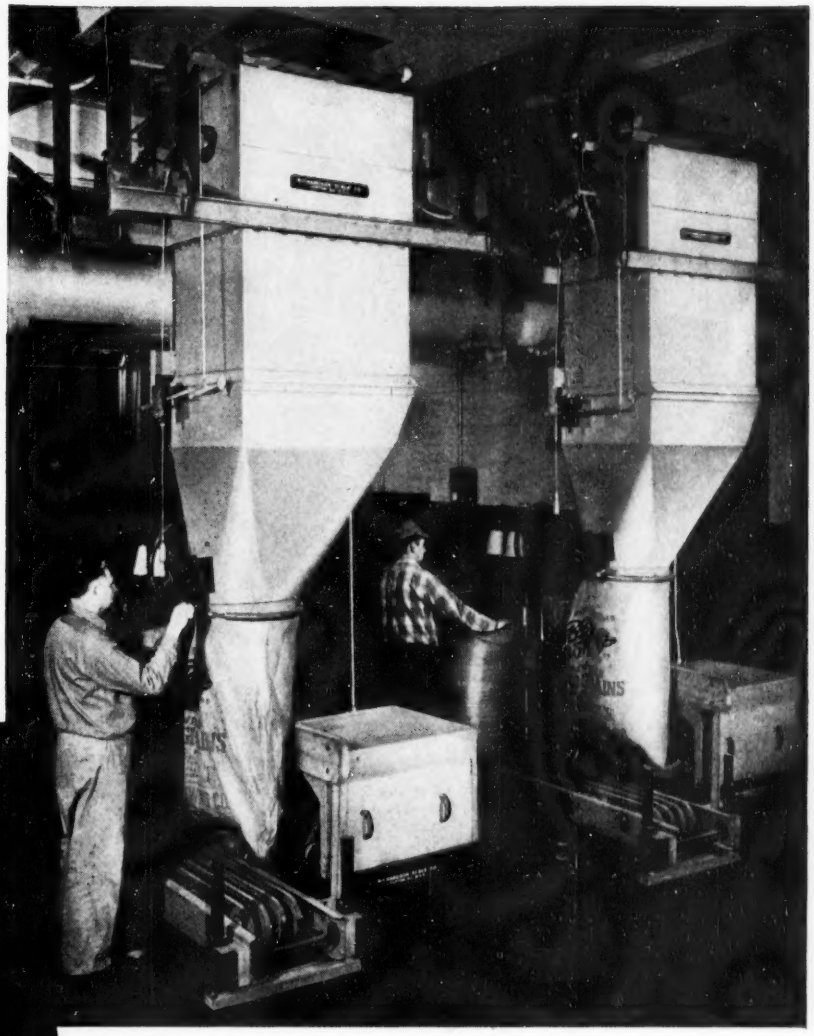
Batter is formed by mixing the corn pulp with flour, salt, black pepper, baking powder and well beaten eggs. Mixture is then frozen.

Digest from U. S. Patent 2,617,735, issued Nov. 11, 1952, on an application dated Nov. 1, 1949, to E. W. Myers, Dayton, Ohio.

MSG Improves Color and Flavor Of Frozen Meats, Vegetables

Addition of monosodium glutamate to many foods prior to packaging and freezing greatly improves their flavor, acceptability, and color. This improvement becomes more evident during frozen storage.

Products investigated were selected from a wide range of fish, fresh and cured meats, poultry, and vegetables. Samples were taken from production lines during regular operations and handled commercially including freez-



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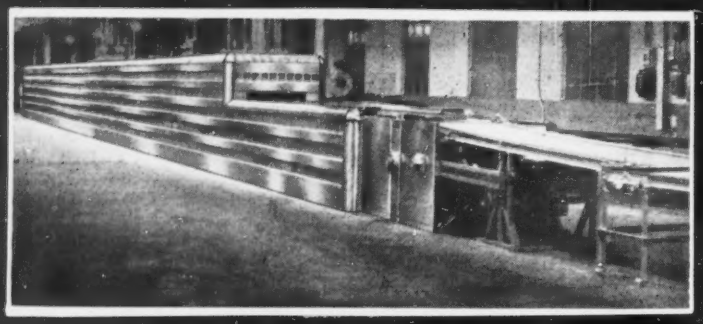

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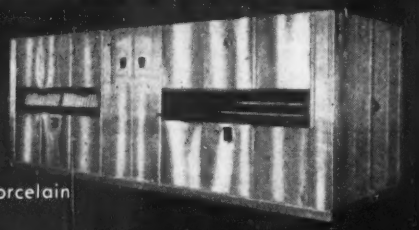

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ing and storage at both 0 and 10 F. Periodic examinations were made (during a 10-month period) visually before cooking, and both visually and organoleptically after cooking. In all cases a concentration of 0.15 percent MSG was used.

Flavor of all MSG-treated vegetables was superior to controls, and this difference became more apparent as the storage period progressed. In green vegetables, color was more brilliant and retained better during storage and subsequent cooking.

Pink color of fresh frozen salmon was retained in treated samples, whereas it bleached out quickly in controls during storage. Green peeled shrimp had brighter color, improved sweeter flavor, and were more tender after cooking than untreated ones. Mackerel, haddock, and rosefish fillets had a finer flavor for a longer time in frozen storage when MSG was added.

All poultry, beef, pork sausage, hams, and bacon were much improved in flavor and texture by treatment, and retained their original high quality for longer periods in storage.

Digest from "The Use of Monosodium Glutamate in Frozen Foods," by K. B. Norton, D. K. Tressler, and L. D. Farkas, *Food Technology*, 405-11, Nov. 1952.

Preventing Odor Pickup By Foods In Storage

Contamination of stored food with foreign odors depends on intensity of odor and duration of storage.

Experimental evidence was obtained in tests with duplicate commercial walk-in coolers, one of which was equipped with means for circulating its air through canisters of activated carbon. Identical fresh food—meat and butter—was placed in the rooms and subjected to various odors: Spices, sauerkraut, pickles, paint, onions, melons, spoiled meats, and rancid fats. These contaminants were intended to duplicate those most likely to occur.

Food was judged by a panel of 10 tasters, who found highly significant differences in flavor of products. Those stored in carbon cooler were far superior to controls. Further, food stored in a contaminated cooler with activated-carbon air purification was considered equal in flavor to that in an uncontaminated room.

Digest from "The Effect of Atmospheric Odors on Food Flavor," paper presented by Amos Turk at ACS meeting, Atlantic City, Sept. 19, 1952.

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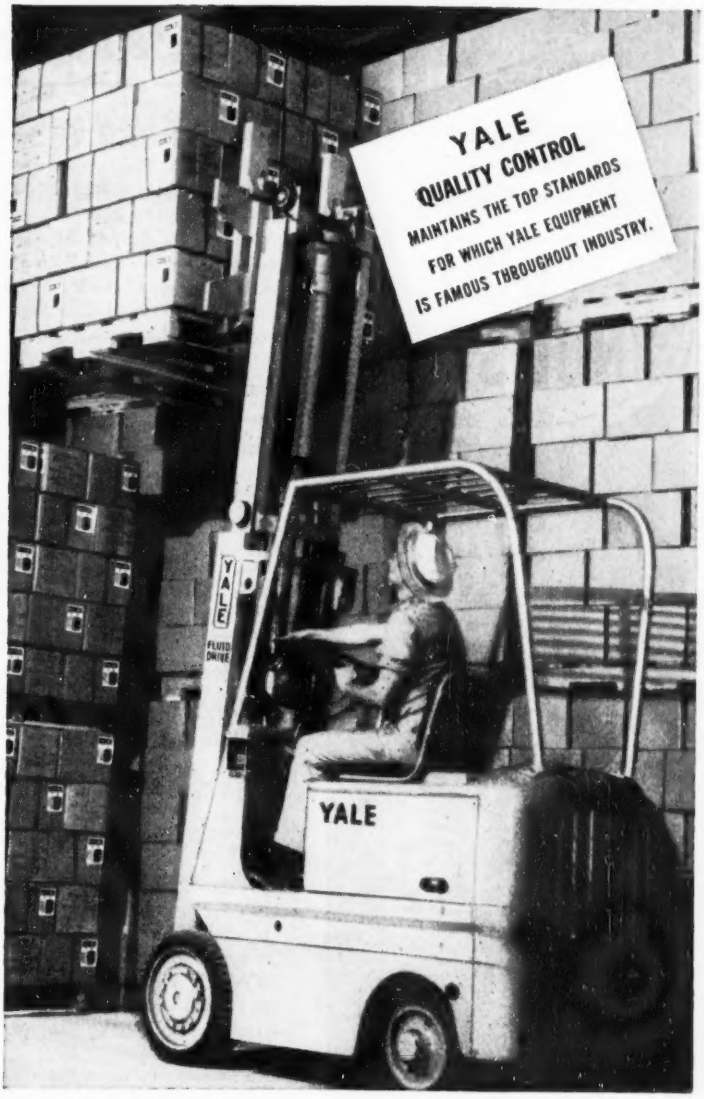

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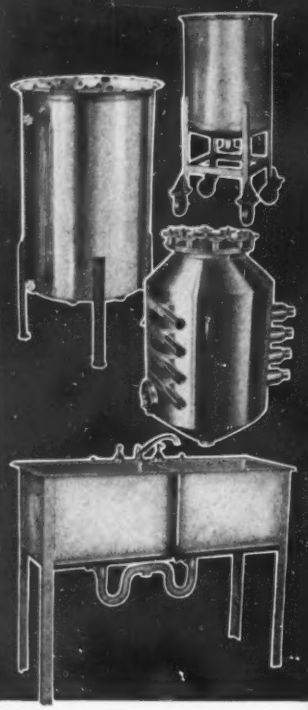

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Questions & Answers

THIS MONTH'S PROBLEM

Question—How can we remove lumps of clay from dry shelled beans without using water. We found that these lumps cannot be removed by screening because of their size. Also, specific gravity of both are almost similar, so gravity-separation methods cannot be readily employed.

Answer to January Problem

The Question Was—We've been extremely careful in selection and preparation of tomatoes and also in our canning operations. Yet, instead of winding up with a good quality canned tomato pack, we end up with a poor one—the tomatoes were almost soupy. Can you suggest where the difficulty might lie and how it can be corrected?

Answer—Not having specific information on your processing techniques, it is difficult to provide a solution.

There are two possible reasons why you are getting a soupy product—excessive heat-processing or handling of the canned tomatoes. Being an acid food with pH values below 4.5, tomatoes are quite easily heat-processed. Ordinarily, it is only necessary to heat sealed cans of tomatoes long enough to reach a temperature of 200 deg. F. in center of the can. Long exposures to higher temperatures will undoubtedly break down cellular structure of tomatoes and make the canned pack soupy.

For more information on heat-processing your pack, we suggest that you contact your can supplier.

Now to excessive handling. When you start your next year's pack, cut open a can of tomatoes immediately after it is heat-processed. If the product is not mushy at this point, then it is certain the soupiness is attributed to subsequent rough handling.

We know of one canner who had a similar problem, and he traced the difficulty to rough handling from retorts to warehouse. To save trucking labor, he installed a gravity-feed can runway to the warehouse. Hot cans then rolled about 350 ft. through several drops, stops, and twists and reached warehouse in a soupy condition.

Sanitizing a Fish Plant

Question—We operate a small fish-filleting plant, and have been confronted with a sanitation problem—presence of offensive odors throughout our plant and a marked build-up in the number of bacteria on the flesh of the fillets. A local bacteriologist told us that the principal sources of bacterial contamination are the gills, skin slime, and intestinal tract. And he suggested that all equipment and cutting boards be thoroughly cleaned with hot water at the end of each day's operation. We have tried this practice, but it has proved ineffective. The odors still persist and tests show that the fillets and equipment are loaded with bacteria. Our process involves scaling and cutting the fish into fillets. We either fresh-pack the fillets in 15-lb. capacity metal containers and cover them with 12-deg. salimeter brine, or dip the fillets 10 sec. in 20-deg. salimeter brine, pack into 1-lb. cartons, and then freeze. We have considered adopting in-plant chlorination, but, at the present time, we feel that this practice is too costly for the size of our operation. Have you any suggestions on what practice or type of germicide should be employed to reduce odors and the number of bacteria on the fish and equipment?

Answer—If you really want to do a good job of effecting better sanitation, then we suggest that you again look into the idea of installing an in-plant break-point chlorination system. Water carrying chlorine, which is maintained beyond the break-point, will greatly reduce slime and other contaminating factors throughout the plant. And, as a result, a definite lowering in bacteria counts on the fish will occur. What's more, objectionable fish-plant odors will be minimized.

Such treated water should be used to wash incoming fish, all equipment, cutting boards, and floors throughout the entire working day. At the Gorton-Pew Fisheries Co. plant, in Gloucester, Mass., feed rate of the chlorinator is set to maintain 5 ppm. of free residual chlorine in process water. However, this residual is increased to 25 ppm. in the evening clean-up period.

One big source of bacterial contamination is in your fillet-brining tank, where it is difficult to maintain chlorine residuals at predetermined levels. This difficulty is attributed to the presence of large amounts of dissolved and suspended organic matter in the brine and the variable flow of fillets through the system. Only recourse is to change the brine about every two or three hours and to keep the temperature of the brine about 32 deg. F.

If you can't reconsider in-plant chlorination, then we suggest using a sanitizing agent. Those commonly employed in fish-filleting plants are the chlorine-bearing compounds—liquid sodium hypochlorite, chlorinated trisodium phosphate powder, and calcium hypochlorite powder.

The first is by far the most effective, since it forms clear solutions with normal water supplies. Chlorinated trisodium phosphate forms cloudy solutions in hard waters and films on processing equipment. Calcium hypochlorite also has a tendency of forming cloudy solutions, which may contribute to soil residues.

Liquid sodium hypochlorite is available in 5 or 12 percent solutions. By its chemical nature, chlorinated trisodium phosphate is limited to 3¼-3½ percent available chlorine. Calcium hypochlorites can be obtained in 15, 50, and 70 percent concentrations.

Usually, the efficiency of chlorine-type germicides is influenced by the pH of the solution. The compound becomes less effective at relatively high alkaline pH's. Liquid sodium hypochlorite has a relatively low pH. Chlorinated trisodium phosphate assumes the pH of the alkaline trisodium phosphate and forms still higher alkaline solutions. Calcium hypochlorite is also relatively alkaline.

These chlorine-bearing compounds should be used in concentrations of 200 ppm. of available chlorine for your sanitizing purposes. And they should be applied to equipment and cutting boards immediately after operations and before use.

Quarternary ammonium compounds may also be used for sanitizing purposes. However, their use is limited in hard waters, which have an adverse effect on the bactericidal efficiency of these compounds. These quarternaries, however, must not contaminate the fish.

Cream Separating Problem

Question—Can you suggest a method of stabilizing sour cream used for packing herring fillets? We are packing herring fillets in glass jars, which are then filled with sour cream. However, after the products are held about 24 hr. at 45 deg. F., the cream "whevs off" (whey separates from the curd.)

Answer—The solution to your problem actually involves the use of a well-prepared sour cream as the packing medium. The cream should have a high butterfat content, preferably above 16-18 percent. And the sour cream should be well homogenized.

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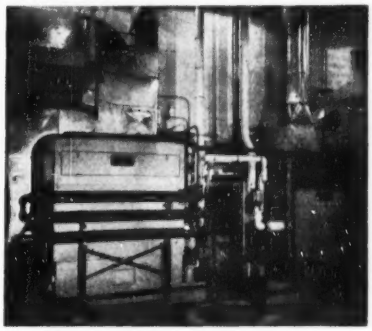

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very popular and many brands are on the market which show no signs of separation.

The use of stabilizers in sour cream will prevent separation. However, the addition of stabilizers is not considered good practice inasmuch as a well homogenized, high-fat sour cream will hold up satisfactorily. Stabilizers such as gelatin or any of the common edible gums will prevent wheying off, but their use is frowned upon by government agencies.

Another possible difficulty may be the addition of insufficient sour cream to the jars. The sour cream then becomes diluted and separation eventually results.

Still another possibility. The jars may not be rinsed properly and thus contain too much liquid, which may dilute the cream.—*Arthur S. Levine, Associate Professor, Department of Food Technology, University of Mass.*

Improving Lard

Question—Recently we heard that some developments have been made to improve performance of lard as a shortening material by a rearrangement of fat molecules. Have you any information on this process, and is it patented?

Answer—According to U. S. Patent No. 2,571,315, assigned to Armour and Co., the texture and plastic range of lard can be considerably improved by rearranging the fatty acids of the glyceride molecule. This rearrangement is carried out by heating lard in the presence of a catalyst. As a result, the crystallizing behavior of the lard is altered to enhance its quality as a shortening agent. The catalyst employed is sodium methoxide.

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to questions in this department, especially to "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

What Is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

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Making Salad Dressing

Question—Referring to question on "Making Dressing Continuously" in your January Q&A column, we would also like information—but on a batch method of manufacturing salad dressing. Can you furnish us with a base formula and complete details for processing a 45 percent oil salad dressing?

Answer—There are three basic steps in manufacture of salad dressing—preparing starch paste, emulsion base, and then blending paste and base.

Starch pastes are prepared in a wide variety of ways. Starch is frequently cooked along with water, vinegar, sugar, salt, and spices. Characteristics of a paste are dependent upon variety and quality of starch and method of cooking and cooling paste. Paste should be creamy, glossy, fine grained, and not gummy, rubbery, or chunky.

A basic paste formula comprises: Water, 43 lb.; vinegar (50 grain), 25 lb.; starch, 9 lb. 3 oz.; and sugar, 7 lb. 13 oz.

Paste is prepared by heating vinegar and part of water (25 lb.) to about 160 deg. F. in steam-jacketed kettle equipped with a scrapper-type agitator running at about 30 rpm. Kettle should be of stainless steel or aluminum, and no exposed copper or brass fittings should contact the acid. Copper produces off-colors and off-flavors.

A smooth, free-flowing suspension of starch and remaining water is then added to the hot water-vinegar solution. Suspension should be introduced only as fast as agitator will mix it or lumps of partially cooked starch will form.

Cooking and mixing are continued until paste is clear and thick. This takes place as paste is held at 185 to 190 deg. F. for about 10 min. Sugar is then introduced and paste is cooled.

Cooling to about 80 deg. F. is necessary, otherwise a warm paste will reduce body of an emulsion and impair its stability. If possible, hot paste should be promptly cooled in a water-jacketed kettle equipped with a slowly revolving agitator. It is preferable to use cooled paste immediately.

An emulsion base comprises: Frozen yolk (10 percent sugar), 13 lb.; sugar, 2 lb. 3 oz.; salt, 3 lb.; dry mustard, 1 lb.; water 5 lb. 14 oz.; vinegar, (50 grain), 6½ lb.; and salt oil, 95 lb. 7 oz.

Introduce the defrosted yolks into a mixing bowl together with sifted dry ingredients. Blend, add about one-third of the water, and whip mixture until it is light.

While whipping at high speed, add oil for about 30 sec. in a thin stream. Continue beating until a uniform, stable emulsion is obtained. Too rapid

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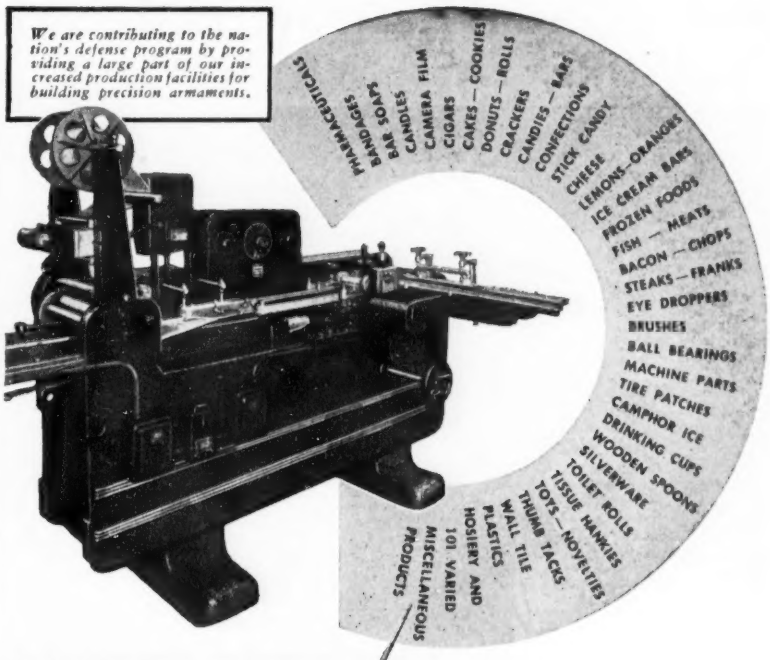

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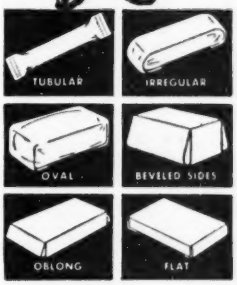

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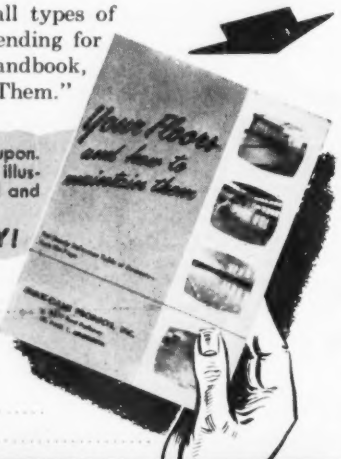

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addition of oil will break emulsion and form a curdled, semi-liquid batch.

Last step in the process is blending 85 lb. of cooled starch paste with 127 lb. of the emulsion base. Mixing is carried out until a glossy, uniform product is obtained.

Caution: Do not over-beat, otherwise the product will lose body and contain air bubbles. Too much air will hasten development of rancidity and result in slack-filled jars.—*Formulas from National Starch Products, Inc., New York.*

Enzyme-Treated Dried Eggs

Referring to your January Q&A, "Stabilizing Dried Eggs," I noted that enzyme treatment of eggs before drying was not mentioned.

It might be interesting to point out that superior quality of enzyme-treated dried egg whites and other egg solids permits their use in prepared angel-food cake mixes and other baked products. Previously, fresh or frozen eggs were preferred or indispensable for these products.

The enzyme preparation, deoxygenase, which consists of glucose oxidase and catalase, is employed to oxidize glucose into gluconic acid and thus prevent browning (Maillard reaction). Enzymatic conversion is simple and easy to control. Yet, it is more efficient than other "desugaring" techniques which do not always yield egg solids free from microbial contamination and undesirable odor.

Absence of odor is also important for egg albumen used for coating Easter eggs and certain other candies.—*Eric G. Snyder, Takamine Laboratory, Inc., Clifton, N. J.*

Regrouting Tile Floors

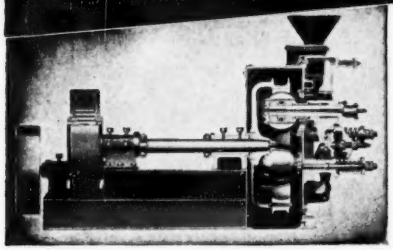
Question—The frequent regrouting of our brick-and quarry-tile floors in processing areas is a maintenance chore that has created quite a problem in our plant. Can you suggest any method of minimizing the time and expense for this work?

Answer—The only way to eliminate occasional regrouting, where conditions detrimental to cement prevail, would be to set the tile initially in a chemically inert resin. Of course, this method is quite expensive when compared to the more conventional cement-mortar setting. And apparently this method was not carried out with your floors.

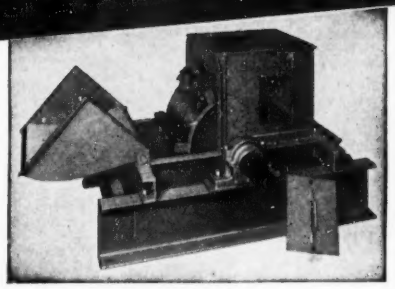
Regrouting with acid-resisting cements, of which there are several on the market, may lengthen the interval between repair jobs.

Another possibility would be the use of bactericidal cements. Under

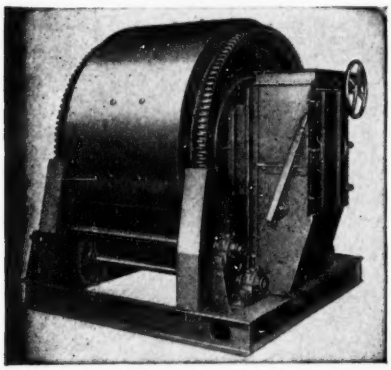
Step-up Production Lower Preparation Costs with STURTEVANT EQUIPMENT



RING ROLL MILL — for medium and fine reduction of hard or soft materials (10 to 200 mesh). Open-door accessibility for easy cleaning. Available in many sizes and capacities.

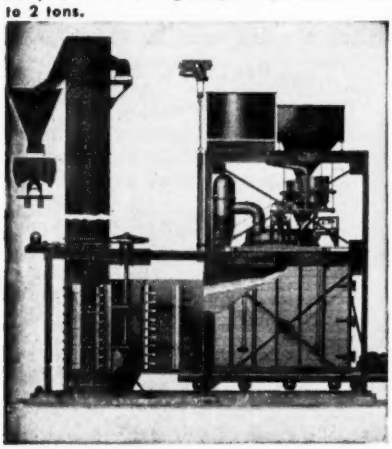


TAILINGS ROTARY PULVERIZER — increases output of fertilizer tailings . . . will not clog . . . leaves no daily accumulation of unground pellets. Capacities up to 25 tons per hour.

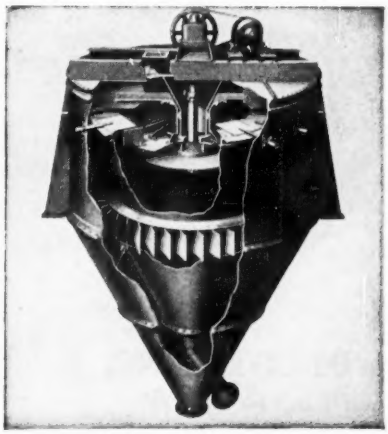


DRY BATCH MIXERS — 4-way mixing action mixes two or more ingredients into an inseparable, homogeneous mass. Open door accessibility makes cleaning easy. Capacities ¼ ton to 2 tons.

MOTO-VIBRO SCREENS — screen everything screenable. Open and closed models with or without feeders. Many types and sizes . . . screens from ½" to 60 mesh.



DEN AND EXCAVATOR — speeds processing of superphosphates. Easily operated by two men . . . produces 16 to 40 tons per batch and up to 480 tons per day of superior fertilizer free from lumps.



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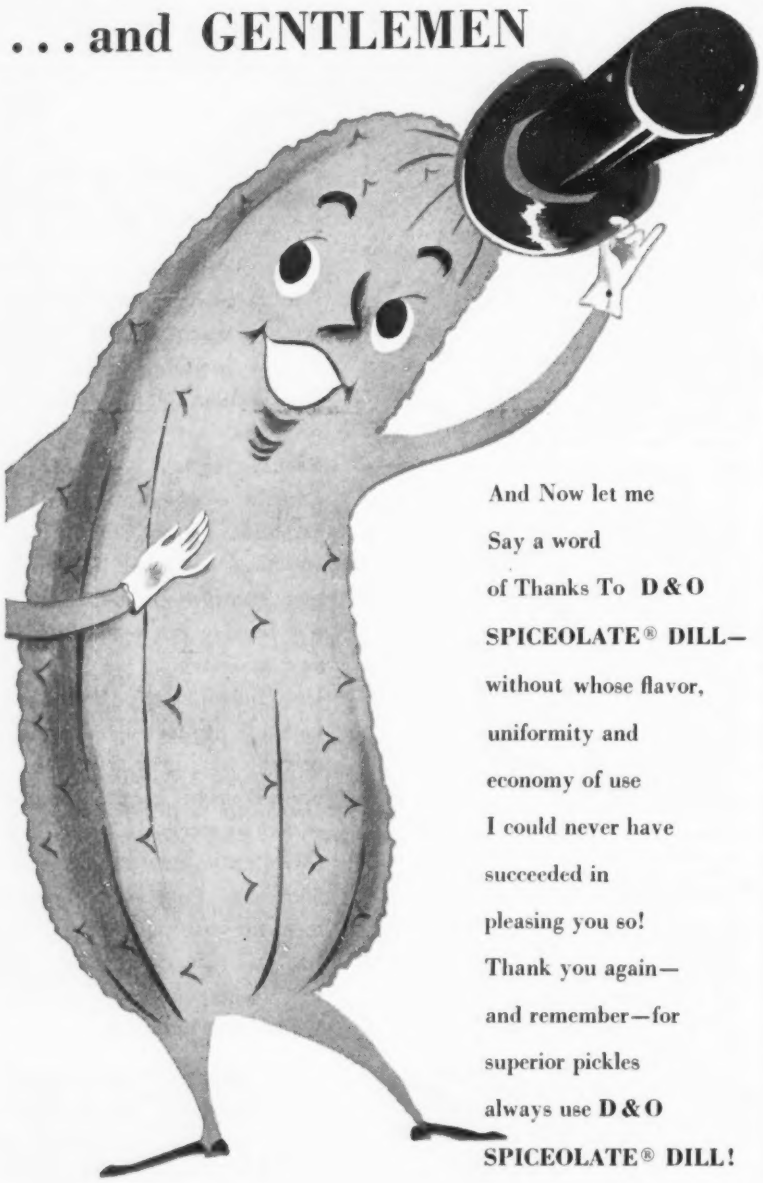
THANK YOU LADIES

. . . and GENTLEMEN



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certain conditions, this material appears to provide longer service life than regular cement. For more information on this material, we suggest you refer to the article, "Anti-Bacterial Cement Gives Longer Lasting Floors", which appeared in the June, 1952 issue of FE.

If your floors were initially laid with comparatively narrow joints, then the time required to work the grouting into the small crevices may be quite a factor in your maintenance expense. If so, we suggest that you try a method used by some tile-floor contractors to good advantage—a powered floor-scrubbing machine of the rotary-brush type to apply and work the grouting into the crevices. You must employ a fairly thin grout with this machine. And, for the sake of appearance, remove excess material from the tile before it hardens.

In some instances where the attack on the grouting is especially severe or rapid, considerable benefits can be derived from the simple expedient of frequent, or even continuous, flushing with water. Favoring such treatment are proximity to floor drains, abundance of water, and little foot traffic.

Trouble With Eggs Spoiling

Question—We grade, candle, and carton fresh eggs. However, we've a problem that has been giving us a lot of gray hairs within the last few years —about one-fifth of the eggs are spoiled when they reach the consumer. These eggs, however, appear normal in the white candling light. Have you any suggestions on what causes this spoilage and how it can be prevented?

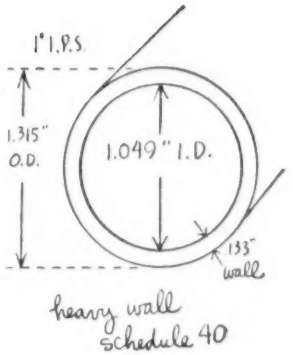
Answer—Your problem is shared by certain other egg-buying firms in the east. It is undoubtedly attributed to faulty handling of eggs on the farm. Spoilage-producing bacteria, particularly the one known as *Pseudomonas fluorescens*, usually penetrate the egg shell, multiply, and cause spoilage. The organism, *Pseudomonas fluorescens*, produces "green rot"—a green pigment formed in egg albumen.

As you stated, eggs infected with this damaging organism appear normal. However, under black light (ultraviolet), these "green eggs" show a green fluorescence. Hence, the nickname, "Sneaky Petes."

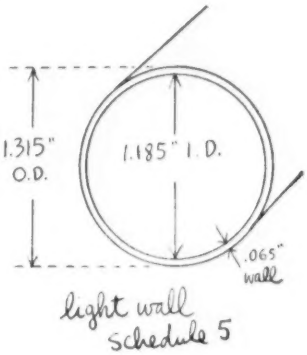
The incidence of green rot parallels a recent increase in egg-washing practices. However, there is a difference of opinion on this subject. Some believe that faulty washing techniques may bring about spoilage by certain bacteria. Others have proved that properly washed eggs can be stored for long periods without loss of quality.

Why pay for Schedule 40 pipe where Schedule 5 is more than adequate ?

Back in the days when iron pipe was virtually the only kind available, it was necessary to specify this



But today with the high strength/weight ratio of stainless steel, the great majority of pipeline and process applications will have an ample margin of safety with this



All sizes of Carpenter Schedule 5 pipe will easily handle 150 psi working pressures. Sizes under 1½" will safely handle considerably higher pressures.

By specifying this light wall stainless pipe you gain many advantages:

1. You save money. Schedule 5 pipe costs about half as much per foot as Schedule 40.
2. Schedule 5 has the same O.D. as Schedules 10, 40 and 80—for hook-up with existing lines as well as for new installations.
3. Its larger I.D. increases flow and capacity in pipelines, exchangers and other equipment.
4. It's lighter. This means quicker and easier installation.
5. You can save 10% to 25% on valves, fittings, weld rods, etc., because smaller O.D. material can frequently be used.
6. Fittings are available from several manufacturers . . . and stocks of Schedule 5 pipe are carried by conveniently located Carpenter distributors.
7. Tubing sizes can now be replaced with light wall pipe . . . for ready hook-up with standard valves, pumps, etc.

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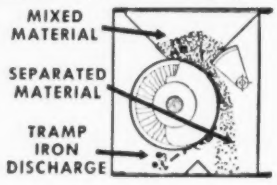
The STEARNS Type "LS" pictured above is particularly designed for dust-tight applications and is built as a complete unit for direct attachment to spouts and chutes. In the diagram at right, note how the tramp iron is separated and discharged automatically.



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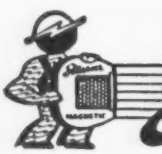

Foremost in the Magnetic Field

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Dirty eggs are costly. Unless cleaned, they must be classified as "dirties" and sold at low price. Therefore, cleaning has become an economic necessity.

There are two general cleaning methods—dry brushing and washing. Dry cleaning involves removing dirt from eggs with a stiff brush, steel wool, or sandpaper. It is a costly process that weakens the shell and increases the number of cracked eggs.

There are also some shortcomings to washing, particularly if warm eggs are placed in cold water. In this case, the egg will shrink inside the shell, and pressure outside the egg (which exceeds the inside pressure) will force water and bacteria through the porous shell.

According to Rohm & Haas Co., Philadelphia, there is a solution to this problem. Use a wash water warmer than the eggs and an odorless detergent to prevent build-up of bacteria in the liquid. In this way, any water remaining on the shell will not introduce infection as it cools. Also, an odorless detergent—compatible with the germicide—should be employed to loosen dirt from the shell.

This firm has developed a combination detergent and sanitizer, which is suitable for any type of washing equipment—from the tub-and-basket system to the units that spray eggs traveling on a conveyor belt. Recommended temperature of the detergent-sanitizer solution is 110 to 130 deg. F. And eggs should be immersed from a few seconds to 3 min., depending upon equipment.

To Prepare Fried Fish

Question—We pack frozen fish fillets in consumer-size packages. We propose to get into production of breaded, deep-fat fried fillets to be packed 12 oz. to a carton and then frozen. Can you furnish us with detailed information on how to prepare such products from ground fish. We plan to start out on a small scale—about 500 lb. of product a day.

Answer—Since you plan producing breaded, deep-fat fried fillets on a small scale, we'll omit including process steps involving mechanized equipment, such as automatic breading machines and continuous fryers.

Here are process details: Cut skinned fillets into uniform, bite-size pieces weighing about 1 oz. Flat fish (flounder and sole) and the tail end of cod and haddock should be cut into ¼x1x1-in. pieces. Also make certain that there are no lateral bones in the fillets.

Now put the pieces of fish in stainless steel trays, holding about 25 lb.

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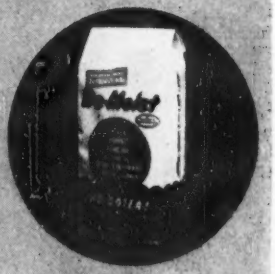

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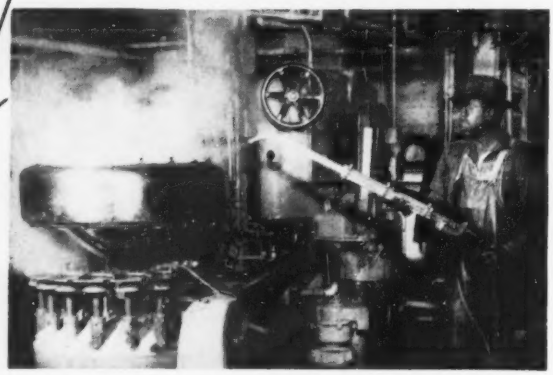
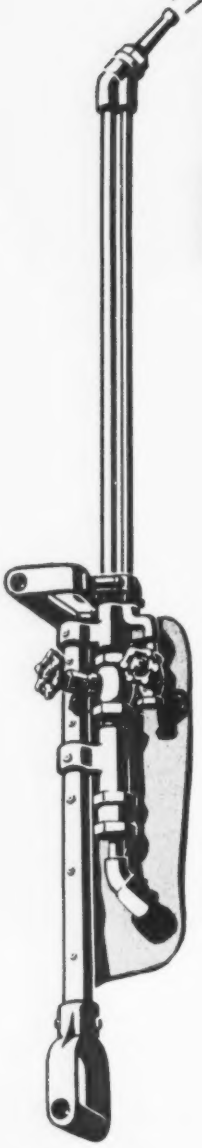
This one man crew





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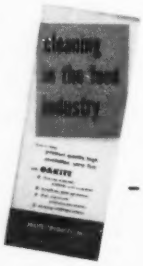

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load trays onto a portable rack, which is then pushed into a 32-38 deg. F. cooler. At this stage, fish are ready for breading and frying.

Breading can be carried out on a stainless steel battering table which consists of six compartments. The pieces of fish are dumped from trays into the first compartment, which serves as a holding bin for about 10 lb. of fish.

From this bin, 5 lb. of fish are immersed into the second compartment containing an all-purpose egg batter. Usually employed is a dry batter mix, reconstituted with required amount of water. This mix comprises cereals, powdered whole eggs, nonfat milk solids, salt, and spices.

After fish are swished around in the batter, they are picked up in a wire-mesh basket and dumped on top of a metal screen directly over the third compartment. Excess batter drains into this compartment and it is reused. Next, screen is tilted so that battered fish fall into the third compartment containing a breading mixture. This mixture consists of toasted wheat, corn and wheat flours, salt, and spices.

Breaded fish are now dropped into the fifth compartment, which also contains breading material. This second breading operation is carried out to assure complete coverage of crumbs on the fish.

Now that the fish are completely breaded, they are placed on frying trays lying over the last compartment. Each tray holds about 12 lb., and tray loads are loaded onto a rack.

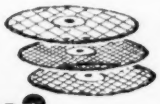
Racks are rolled to two batch fryers, which are operated alternately by one worker. Here, trays are placed on foot-operated carriages that immerse them into 375-deg. F. fat and then lift them out of the fryers. Breaded fish are fried 1–2½ min., depending upon thickness of pieces. Trays of fried fish are then transferred to a stainless steel, inclined table, where the oil drains into the frying vats. Draining takes about 2 min.

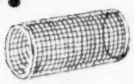
Frying oil should be clarified at least twice a day in a pressure-type filter, which employs an asbestos pad and diatomaceous earth (filter aid).

Fried fish must now be cooled before packaging. Cooling can be carried out in a cabinet-type forced air cooler, equipped with high-velocity fans. Means should be provided for venting air from the unit to outside of building. Racks containing trays of fried fish can be rolled into the cooler.

Finally, the fish are packed into 12-oz. greaseproof cartons with greaseproof liners. Cartons are checkweighed and loaded into a freezer. Then cartons are overwrapped.

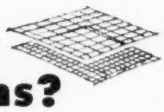
filter leaves?





strainers?

sizing screens?



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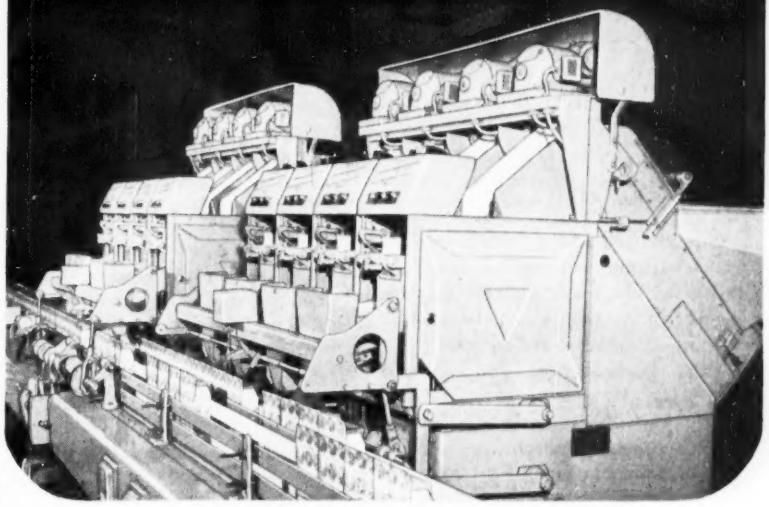

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Useful New Books & Government Publications

Dairy Plant Efficiency

DAIRY ENGINEERING, SECOND EDITION. *By Arthur W. Farral. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 1952. 477 pages; 9¼x6 in., cloth. Price $6.*

New plant design data, waste disposal, labor-saving methods, and equipment servicing, are among the engineering phases treated in this well illustrated book. Photographs, charts, and graphs are offered by the author to aid the dairy plant owner gain greater efficiency through new developments and processes.

To original edition has been added information on new designs and servicing, as well as detailed data on high-temperature, short-time pasteurization equipment. Latest sanitary standards are also covered.

The author is professor and head of department of agricultural engineering at Michigan State College. He has served with numerous specialized technical committees dealing with food and dairy machinery and sanitation.

Keeping Costs Down

HOW TO CONTROL PRODUCTION COSTS. *By Phil Carroll. Published by McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, 1953. 272 pages; 6¼x9¼ in., cloth. Price $5.*

Maintenance of quality of product, while keeping costs at a minimum, is covered here from the accountant's viewpoint. Specifically treated is control of production costs through application of overhead expense in terms of conversion time, and in accordance with rates caused by different products in multi-product companies.

Book is written by a consulting industrial engineer, author of various works on industrial accounting.

Britisher's Notes on Food

TOWNSMAN'S FOOD. *By Magnus Pyke. Turnstile Press Ltd., 10 Great Turnstile, London, W. C. 1, 1952. 212 pages; 5½x9 in., cloth. Price 15s.*

Views of a Britisher—a food chemist and former principal scientific officer of the Ministry of Food—are given in this latest compact, easy reading text.

A variety of ethical concepts in the manufacture of food are discussed to illustrate complexities of choice facing some processors. Most pertain to problems arising in the British Isles. But some have broader implications.

The work is not intended as an exposé. In fact, it is devoted primarily to an adult discourse on the role of technology in processing. Nutrition, in terms of what happens prior to food reaching the table, is also treated.

The text touches on many processing factors, and strong reflections are included of the author's own evaluations of their influences on the foods.

Water Survey

WATER QUALITY CRITERIA. *California State Water Pollution Control Board Publication No. 3. Documents Section, State Printing Division, 11th and O Sts., Sacramento 14, Calif., 1952. 512 pages, cloth. Price $3.*

Necessitated by provisions of the California Water Pollution Control Act (1949), the comprehensive research project covered in this report comprised a literature survey and preparation of a compendium of all known data on water-quality criteria with regard to almost all beneficial water uses and most contaminants and pollutants.

The study was made for the State Water Pollution Control Board by the California Institute of Technology, Pasadena, under direction of Prof. J. E. McKee.

Following introductory material, results of the literature search are presented under four main headings: First, compilation of water-quality criteria as promulgated by state and interstate control agencies in the U. S. Second, a review of judicial expressions dealing with water-quality criteria (instances of water-pollution litigation in which the courts have mentioned the validity, reasonableness, or applicability of technical data and standards. Third, the quality objectives for major beneficial uses of water.

The fourth major section is a listing of all potential pollutants on which data are available. This chapter is arranged alphabetically by the correct or most common names of physical, inorganic, organic, biological, or radioactive substances.

Organizational Problems

PLANNING AND DEVELOPING THE COMPANY ORGANIZATION STRUCTURE. *By Ernest Dale. Published by American Management Assn., 330 W. 42nd St., New York 36, 1952. 250 pages; 6¼x9¼ in., cloth. Price $4.50.*

In another 25 years, says the author, it may be very common for the head

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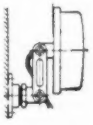

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offices of large corporations to accent management endeavors — counseling and aiding their manufacturing and distributing groups, with the objective of combining economic advantages of size with independence.

Written as a research report, the book covers an exhaustive investigation of company organization problems, and it cites considerable evidence of dissatisfaction, among managements, concerning organizational performance. Among trends discussed are group-rule, control centralization, and gradual reorganization. Indexed, the book offers a thorough bibliography.

Author is an American Management Assn. research associate and assistant professor of industrial relations at Columbia University.

Government Publications

TECHNOLOGY IN FOOD MARKETING. *Agriculture Monograph* 14. *USDA*, 1952. 115 *pages*; 8x10¼ *in., paper. Price* 55c. Document summarizes principal developments of technology in food marketing, and it appraises current influences and probable future effects. Subtitle is "A Survey of Developments and Trends in the Processing and Distribution of Farm-Produced Foods, 1930-1950." It closes with a comprehensive bibliography.

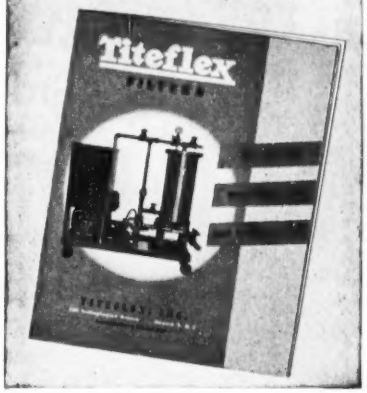
SLAUGHTERING, MEAT-PACKING, AND RENDERING (Occupational Hazards to Young Workers, Report No. 10). *Bureau of Labor Standards, Bulletin No.* 157. 37 *pages*. 20c. Describes hazards to 16- and 17-yr.-old workers, pursuant to Hazardous-Occupation Order No. 11, effective July 21, 1952.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS 1951. *USDA, Statistical Bulletin No.* 120. 36 *pages. Free.* Latest comprehensive data for market analysis of dairy products buying and selling by commodities and states.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

THE INDUSTRIAL UTILITY OF PUBLIC WATER SUPPLIES IN THE PACIFIC STATES, 1952. *Geological Survey Circular* 232. *U. S. Geological Survey, Washington* 25, *D. C.* This is fifth of series of nine preliminary regional reports based on 1950 information, to supersede USGS Water-Supply Paper 658, issued in 1932.

REDUCE FILTRATION TROUBLES!



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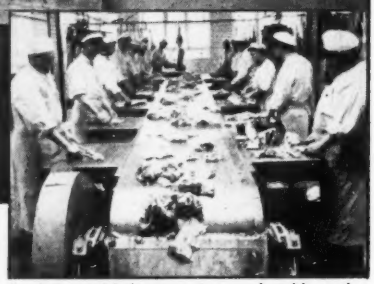
An eight-foot wide Sandvik steel-belt conveyor used for handling cans of shortening. The plant where this conveyor is installed has experienced up to 25 years of satisfactory service from an earlier Sandvik conveyor installation.



Sandvik steel-belt conveying work table makes cutting up of dressed hogs a continuous production line operation.

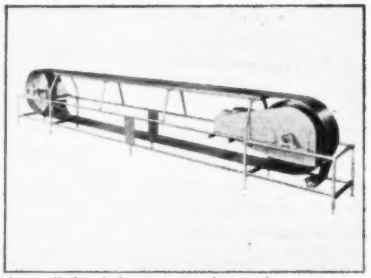
The smooth, impervious, easy-to-clean surface of Sandvik steel-belt conveyors has improved processing of a wide variety of foods. Here are some reasons why:

The conveying band provides a continuous, unbroken flat surface of stainless or carbon steel. — Live steam or boiling water can be applied directly. — Steel scrapers can be used for cleaning or discharge. — Withstands baking or drying temperatures. — No taste contamination. Smoothness facilitates slide handling (a vital advantage for can conveying). — High load capacity. — Long service life. — Belts can be of any length or width.

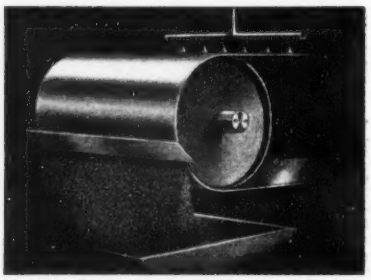
COOLING ARRANGEMENT—Sandvik conveyors can be built with a patented water-bed arrangement which cools from beneath . . . no water gets on top of the band. You can cool and convey, regulate thickness while cooling, cool and strip off gelatinous materials in sheet form, cool loose and pulverized materials, cool solids in sheet form and cool materials in layers.

ENGINEERING HELP—Sandvik's engineering department will be glad to work with you in designing a conveyor to fit your operation. Sandvik has had over thirty years of experience in designing conveyors to operate either as independent units or as integral parts of special processing equipment.

Write, wire or phone for further information.



A small Sandvik conveyor designed to cut meat handling costs.



Simplified illustration showing how Sandvik steel-belt was used in a continuous vacuum drier for soluble coffee. Scraper blade removes crystallized coffee from band.

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

New Canned Milk

Latest entry in the canned whole milk field is L. T. Winger, Sr., of Denver, whose patented process employs a combination of chemical and heat treatments.

In the process, developed at Colorado A.&M. College, food grade hydrogen peroxide is added to milk at 130 deg. F. After 30 min., an enzyme (catalase) is added to remove excess H_2O_2. Then the milk is canned and sterilized in an end-over-end unit (see FE Feb. 1953 p. 72).

First commercial plant to produce Winger milk is Cass Clay Cooperative Assn., Moorehead, Minn.

Flour Tubed From Truck

Truck distribution of bulk flour to bakers gained momentum when Atkinson Milling Co., Minneapolis, recently started deliveries full-time to Purity Bakeries Corp., St. Paul.

Flour goes from truck to bakery via a 3-in. tube at the rate of 800 lb./hr., moving to distances of more than 140 ft. All actuating equipment is on the carrier. Capacity is 40,000 lb. (For further details of system see "New Bulk Flour Truck Aids Miller, Baker," FE Oct. '52 p. 103.)

Vapor-Sealed Salad Oil

Vacuum-vapor seals are being introduced by Kraft Foods Co., Chicago, in its salad and cooking oil bottles. The vacuum prevents oxidation—major cause of rancidity in bottled edible oils. Thus flavor and freshness are maintained and shelf-life extended.

Pry-off caps hold the seal, replacing screw-on caps, which do not hold a vacuum. Other foods subject to rapid oxidation, such as baby foods, peanut butter, pickles, catsup, and preserves, have long used the method.

Grades Eggs by Color

Working on the finding that brown shells reflect less blue light than white ones, USDA engineers have developed an experimental machine for automatically grading eggs by color.

It has accurately placed eggs in their proper color class in repeated trials, and in only border-line cases has there been a tendency for them to go into wrong trays.

Young Researchers Offer New Facts On Fats, Juices, Drying, Dairy Tests

Interesting new practical technical information was presented by five young food laboratory technologists at the January meeting of the New York Section of IFT.

Stabilizing Fats

Recent developments at The Best Foods Laboratories in the stabilization of edible fats were reviewed by Carl Brown. Mono-isopropyl and mono-stearyl citrates, since they are much more soluble and easier to use, are preferred to citric acid as metal-deactivators in edible oils and fats, where deterioration may occur as a result of unavoidable iron and copper contamination.

These esters not only extend the keeping-time, but also improve the overall flavor performance of oils. A modified A.O.M. test, utilizing iron tubes in place of the customary glass tubes in a comparison of commercial antioxidants, demonstrates the superiority of the citric acid esters in protecting oils against continual metal pick-up.

Orange Juices Compared

A comparative study of fresh orange juice and frozen concentrates, carried out on a monthly basis over a two year period, was discussed by Mathilda D. Zinn, Good Housekeeping Bureau. Samples were purchased in five representative neighborhood stores. The two-year averages show (1) comparable vitamin C levels for the fresh and frozen juices; (2) more uniform sugar-acid ratios for the frozen juice; (3) lower and more uniform peel oil levels for the frozen juice (peel oil in fresh juice varies widely with the type of reamer used); and (4) for the New York area, consistently lower cost per 100 cc. of juice for the frozen concentrates. Taste panels generally preferred the flavor of the fresh juices.

Solving Drying Problem

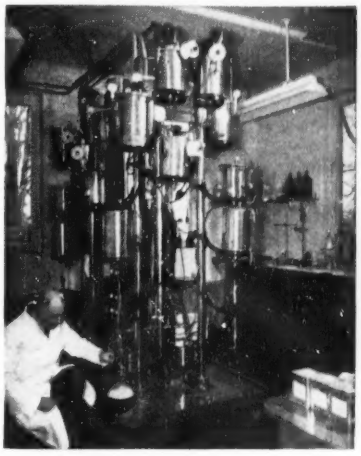
How to achieve maximum production from a gelatin evaporator-dryer installation was described in a paper by Franklin Dramer and Louis Garono, General Foods Central Research Labs.

First, steam pressure on the evaporator was increased, and baffles were installed in the dryer tunnel to prevent air bypass. Next, the water-removal loads on evaporator and dryer were balanced for maximum combined output.

Curves were plotted for capacity of evaporator effluent—under both summer and winter operating conditions. The points where evaporator and dryer curves crossed gave the proper effluent concentration for maximum throughput of the system.

New Microbe Counter

A new technique, using the Millipore Filter, to concentrate and enumerate microorganisms in large volumes of liquids was described by Carroll P. Burke, National Dairy Research Labs. The original purpose of this filter was to determine low



"Pint-Size" Brewery

This miniature brewery comprises four separate experimental units, each capable of producing 2½ pints. Of stainless steel, units provide flexible control over many variables involved in brewing. They are located in the Applied Div. of the British Brewing Industry Research Foundation. Problems under investigation are factors responsible for "head" on beers and the production of dehydrated and also concentrated beers. (Eastern Publishers)

numbers of coliform organisms in water supplies.

Preliminary investigations have shown that in artificially infected water, higher counts were detected than by the standard plate count. And these higher counts were accompanied by sterile effluents.

Results prompted work to determine if the filter might be used to evaluate the sanitation of pipe lines and other equipment. Laboratory tests indicated applicability, and plant runs using this technique were made and results were favorable.

The filter can also be used in enumerating psychrophilic bacteria in milk, checking air contamination of large areas, and producing a sterile air supply.

And this filter is further visualized for examination of concentrated food products for which existing sterility tests are inadequate.

The filter is considered to be a useful new tool for technologists.

Quick Milk Test

A rapid and accurate method for analysis of the sulphydryl groups in milk, developed in The Borden Co. biochemical research laboratories, was explained in a paper by Gunter Zweig and Richard J. Block.

Located in the whey protein fraction, the sulphydryl groups are determined by a method based on the titration of mercapatans. The method may be adapted to quality control of milk; e.g., determining the extent of heat treatment to which a milk sample has been subjected. The apparatus consists of a rotating platinum electrode, a calomel electrode, a galvanometer, and an automatic buret.

Poultry-Waste Control Cuts Disposal Costs

Quantity of sewage from poultry processing plants can be cut 10 to 15 percent by waste-saving practices, according to A. J. Steffen, of Wilson & Co., speaking before the recent Fact Finding Conference of the Institute of American Poultry Industries.

He pointed to an attendant BOD drop of 70-80 percent and reduction of solids from 60 up to 90 percent, citing actual operating records.

Major waste-cutting methods were listed as: 1. Scraping and brushing battery pans in feeding stations, before washing; 2. dry cleaning feeding station floors; 3. saving and coagulating blood for disposal through rendering plants; 4. providing refuse containers for grain from milking crops, manure from venting, and gizzard contents; 5. turning off spray water when not in use, and keeping flow at reasonable minimum; 6. using trigger valves on hose nozzles to make sure water is off when not in use; and 7. reducing leakage losses by keeping valves in good repair and installing a master valve on the line at the water meter to shut off the supply at end of the day's operation.

Positive Sealing of Liners

A new process, "Twin-Sure," is stated to provide positive, safer sealing of seams in polyethylene liners for drums, cartons, and bags, especially for heavy-duty use.

According to the developer, Protective Lining Corp., N. Y. C., four major sealing hazards are now overcome: (1) Weakening of liner along the seamline; (2) too-deep sealing, causing an extrusion along edge; (3) excess heating, making for a fragile seal that will not support the contents; and (4) defective fusing, thus resulting in leaky seals.

Employed is a specially designed machine that automatically adjusts for sealing temperature and pressure as required by the specific film.

Study Tells Way to Reduce Damage to Beef in Transit

How to protect dressed beef from damage during rail transit is indicated by a new study covering records on shipments of more than 3,600 cars of meat over a 12-month period.

Solution advised: Better care of cars and more care in loading.

The investigation, made under authority of the Agricultural Marketing Act and with cooperation of the Railroad Perishables Inspection Agency and other bodies, cited loss and damage claims running $1,500,000 or more a year—up over 700 percent since 1939.

It was found that much of the damage is caused by quarters of beef being thrown from their hooks to the car floor enroute, resulting in torn and soiled meat.

Car inspection drew attention to mechanical defects serious enough to have contributed. Worn coupling shock absorbers were disclosed as common causes of excessive shocks sufficient to "throw" the meat.

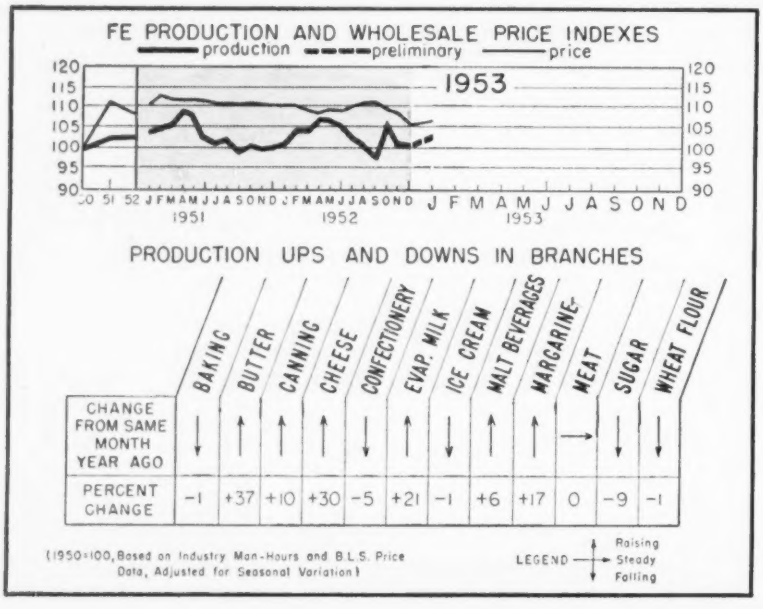
Insertion of the meat hook under the fourth rib on the forequarter is stated to make for a safer hold, and it is recommended that quarters be hung tightly together to reduce sway of the meat when car is in motion.

The 26-page report, *Loss and Damage in Rail Transportation of Dressed Beef*, may be obtained from Office of Information Services, Production & Marketing Administration, USDA, Washington 25, D. C.

Standard for Ultraviolet

For checking reliability of spectrophotometric readings in the ultraviolet region, a standard has now been developed at the National Bureau of Standards. This together with the previously issued glass standards for the visible range makes it possible to assure precision of readings through the entire spectrum.

The new standard consists of an alkaline solution of potassium chromate containing 0.04g. K_2CrO_4 per liter in 0.05 normal KOH. Values for spectral transmittancy for 1 and 2 cm. thicknesses of solution were obtained over wavelength range 215-500 milli-



microns. Changes with variations in temperature were small above 235 μ, but large from 215-235 μ. Method of preparing solution and calibration data are provided by NBS.

15 Billion Dairy Bottles!

Approximately 15,000,000,000 bottles will be used this year by some 20,000 dairies for bottling fresh milk and cream, according to the Glass Container Manufacturers' Institute.

It states that of these units 61 percent will be quarts, 27 percent half-pints, and 12 percent pints or half gallons.

As for the question of glass vs. paper containers, the Institute reports the current ratio as glass, 70 percent; paper, 30 percent.

Up Fowl-Scalding Temp.

Scalding temperatures up to and including 140 deg. F. for whole and cut-up chickens have been pronounced acceptable for the armed forces by the Q.M. Food & Container Institute, following recent tests. Mess stewards and first cooks, acting as judges, found no significant appearance or flavor differences in comparison with 130-deg.-F. scalded poultry, used as controls in the tests.

Hors d'Oeuvres

▶ At the University of California College of Agriculture, plant breeders are trying to produce a fuzzless peach. We thought Nature did that in the Garden of Eden.

▶ **Britain's movie magnet, J. Arthur Rank, lost money at the box office last year. But he made more than $3 million selling ice cream to moviegoers. Wait 'til Rank hears about popcorn!**

▶ Reminds us of two major moviehouse needs: (1) A silent popcorn bag. (2) A Disposall at every seat.

▶ **Potato chip consumption has passed 336 million pounds a year. Despite declining direct consumption of potatoes, spud growers are feeling chipper.**

▶ Way back in 1890, Campbell and Heinz each decided to develop a canned soup business. To this day neither feels that it made a mistake.

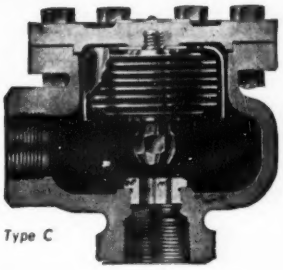
▶ **The cost of a "full dress" dinner for six would take half a month's pay for most Russians. Then again, without the cost of a single shot, the Reds gobble up entire nations.**

▶ Oregon State College is developing a filbert-skinning process. Denuded chemically, the nuts may be worth an extra 15¢ a pound. A bare profit.

Nicholson Steam Traps

CUT KETTLE TIME 30%

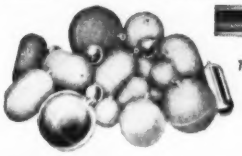
for Leading Food Packer

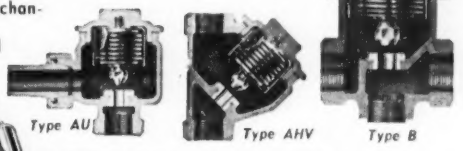


Type C

Records of a recent installation of Nicholson steam traps, by a large processor, show they cut kettle time 30%. For example, one operation was shortened from 65 to 45 minutes. Nicholson units keep equipment full of live steam because: 1) they operate on lowest temperature differential; 2) have 2 to 6 times average drainage capacity; 3) maximum air-venting capacity. See why leading plants are increasingly standardizing on Nicholson's thermostatic steam traps.

HIGH - PRESSURE FLOATS — Stainless, monel steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms or as vessels. Quick delivery. **BULLETIN**





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You Can't Beat

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The thorough, fiber by fiber Neoprene impregnation of this belting is responsible for its successful resistance to vegetable, mineral, and fruit acids and oils . . . simply cannot pick up odors or small particles. To clean . . . use boiling water or steam. It's tough . . . resilient . . . built right to meet the rigid requirements of the food processing industry. For trouble free service and long-term economy, specify Victor 475 Food Conveyor Belting. Send for Bulletin #18.

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0.1 ppm in crystallizing sodium bromide
3 ppm in textile sizing solutions
3 ppm in cooking syrups
10 ppm in Geon latex
4.5 ppm in yeast fermentation

Dow Corning Antifoam A is odorless, tasteless and physiologically harmless. And it is most economical to use because it is effective in such amazingly low concentrations. Dow Corning Antifoam A can be used as received, dispersed in a solvent or mixed with one of the foaming ingredients.

Dow Corning Antifoam A Emulsion is widely used in the industrial processing of aqueous foamers. Dow Corning Antifoam AF Emulsion is equally effective in aqueous systems and designed for use in the food processing industries.

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Radiation, Quick Freezing Can Curb Trichinosis

Two new means of controlling *Trichinella spiralis*, causative agent of trichinosis, are reported. One involves treatment of the pork with ionizing radiation, such as X-rays, gamma rays, and high energy electrons. The other utilizes quick freezing.

It is the belief of Henry J. Gomberg and S. E. Gould, of the University of Michigan, that large sections of hog carcasses can be irradiated by highly penetrating cobalt-60 gamma rays to interrupt the trichina life cycle, thus stopping ingested larvae from growing to maturity and reproducing.

Tests revealed radiation doses less than needed to kill will inhibit maturation of larvae. Even smaller doses sterilize female trichinae.

The freeze method, described by Donald L. Augustine, of Harvard, calls for (1) rapidly lowering the temperature of pork to −35 deg. C., or (2) initially quick freezing it to −18 deg. C. and holding the meat three days at this temperature.

Of 60,000,000 hogs slaughtered annually, some 950,000 are infested with trichinae, according to an estimate by Vernon B. Link, U. S. Public Health Service, Atlanta, Ga.

Poultry Jet-Frozen

Jet-propelled refrigerated air is utilized in a special poultry freezing system newly incorporated in the Alford Refrigerated Warehouses, Dallas, Tex.

Here, pallets with separating racks are stacked in a manner which provide a central open portion, or "chimney." Air blast jet-nozzles project downward from overhead ducts. A pressurized cushion of air forced into the chimney space in large volume passes through the racks.

System reportedly handles larger quantities of produce with greater flexibility and less power consumption than conventional tunnels. Alford is now freezing up to 200,000 lb. of turkey daily.

Microbiology Periodical

Newly launched bi-monthly magazine is *Applied Microbiology*, concerned with "application of microbiological sciences to the fields of industry, foods, sanitation, agriculture, and other areas." First issue, dated January, carried a dozen feature articles and ran 60 pages. The periodical is sponsored by the Society of American Bacteriologists and is published by The Williams & Wilkins Co., Mount Royal and Guilford Aves., Baltimore, Md. Editor is H. B. Woodruff, of the microbiological research department of Merck & Co. Yearly subscription is $7.50.

Improved Tomato Packing

By using the most efficient methods of prepackaging tomatoes at terminal markets, labor efficiency may be increased about 36 percent, according to a survey conducted by the Production & Marketing Administration, USDA.

Most of the savings would result from better sorting and packaging. For example, sorting fresh tomatoes from one conveyor belt onto another was found better than working from one container into another. Also, sorting from jumble-packed 60-lb. containers improved upon operating from standard 32-lb. capacity lug boxes, where tomatoes are wrapped and hand-packed. Savings in labor were 17 man-hours per carload using jumble-packed rather than hand-packed containers.

Partial tray-filling was more efficient than complete tray-filling. In the former method, each operator packed one or two tomatoes into a tray moving on a conveyor.

Food Men Check MSP

Prominent roles are being played by food industry leaders on special businessmen survey teams currently traveling abroad to evaluate the work of the Mutual Security Program.

Clarence Francis, General Foods Corp. chairman, heads the 55-man inquiry group. Harry A. Bullis, General Mills chairman, is leader of the team visiting Formosa. And Frederick M. Sayre, Corn Products Refining Corp. honorary chairman, is with the Netherlands-Belgium group.

Harvard Teaches Food Law

Significant instruction on the food and drug law is now being provided by the Harvard Law School in general cooperation with The Food Law Insti-

"DID YOU BUZZ FOR ME, BOSS?"

For Western Can Makers

Kaiser's new Fontana, Calif., mill is slated to be turning out tin plate at full rated capacity — 200,000 tons/year — by mid-'53. Second such facility west of Mississippi, its full year's output has already been bought by can makers. Here, worker assorts plate in electrolytic department.

tute. The work is given in a commercial law graduate seminar, to which seniors are admitted, and also in an undergraduate course on such law.

The Food, Drug & Cosmetic Act is principally dealt with, states Charles Wesley Dunn, president of the Institute, which has supplied the Kleinfeld-Dunn books for use as texts. The Institute also furnishes lecturers.

Profit in Mid-Size Cannery

Ideal size for canning operations in Wisconsin—from both the processing and profit viewpoints—is the medium, rather than large or small plant.

This is the conclusion of Prof. Charles W. Miller, of Marquette University, who reported on special state studies at the 1952 Wisconsin Canners Assn. convention.

A number of data tables based on state income tax returns for the years 1946 through 1950 supported the professor's recommendation that the enterpriser contemplating setting up a new plant from scratch stood the best chance of success with the middle-size operation.

Return on investment was shown to average 23 to 25 percent for firms whose annual sales ran between $500,000 and $1,500,000. Above and below such sales totals, returns fell under 20 percent.

Here's why Food Plants prefer DAY DUST CONTROL

Soybean Extraction Plant of the Glidden Company at Indianapolis, Indiana. **DAY** Dust Control Systems eliminate dust problem in this plant.

DAY "AC" Dust Filters consistently provide filtering efficiencies as high as 99.99+%. They effect important savings by reclaiming valuable products, and by separating dust from two or more exhaust streams within the same filter. They save space and are easy to install. Users report that the **DAY** "AC" Filter is setting new standards for efficient and economical dust control.

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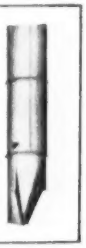

Built in sections, gang punched for field bolting. No riveting, soldering or welding required. Your maintenance people can make the installation. Write for Bulletin 529.

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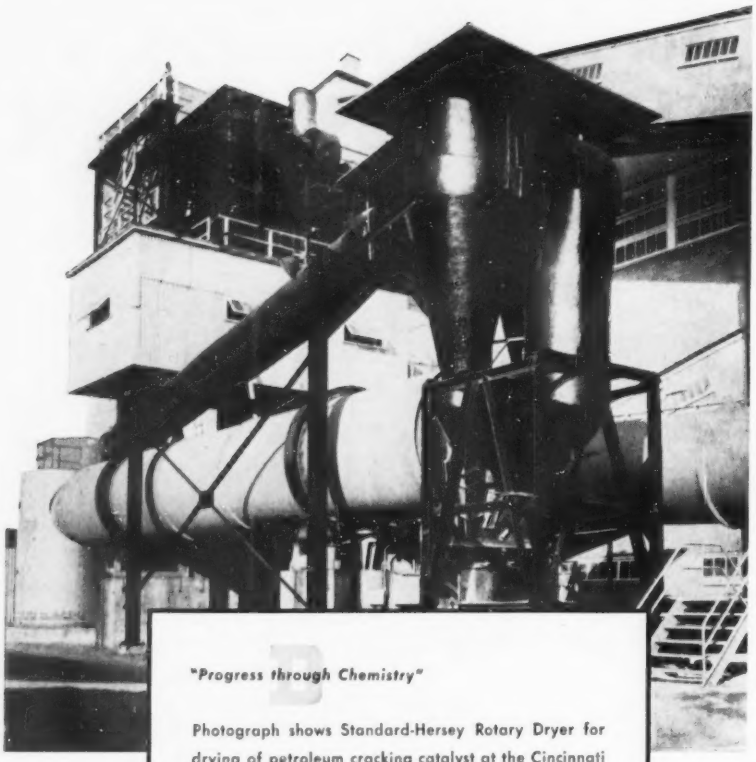
For more information, use coupon on page 157.



"Progress through Chemistry"

Photograph shows Standard-Hersey Rotary Dryer for drying of petroleum cracking catalyst at the Cincinnati Plant of The Davison Chemical Corporation. Patented Standard-Hersey intermediate-feed system makes the unit in reality a combination flash and rotary dryer with most desirable characteristics of each.

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Each year scores of new names are added to the list of well-known Standard-Hersey Dryer users. The Davison Chemical Corporation is another leader in its field which has joined the swing to STANDARD-HERSEY drying.

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Schedule of Events

March

17–18—Northwest Canners Assn., annual meeting, Chinook Hotel, Yakima, Wash.
19–21—Pacific Dairy & Poultry Assn.; Olympic Hotel, Seattle, Wash.
20—Dairy Products Improvement Institute, annual meeting; Hotel Commodore, New York City.
29–31—United States Wholesale Grocers' Assn.; Shoreham Hotel, Washington, D. C.

April

11–15—National Fisheries Institute Annual Convention; Shoreham Hotel, Washington, D. C.
18–19—Packaging Machinery Manufacturers Institute; Sheraton Hotel, Chicago.
19–22—United States Wholesale Grocers' Assn. Convention & Exposition; New Orleans.
20–23—Frozen Food Industries Exposition; Grand Central Palace, New York City.

May

4– 6—American Oil Chemists' Society annual meeting; Roosevelt Hotel, New Orleans.
11–13—Millers' National Federation; Edgewater Beach Hotel, Chicago.
18–21—Assn. of Operative Millers; Hotel Nicollet, Minneapolis.
18–22—Materials Handling Exposition; Convention Hall, Philadelphia.
24–28—American Assn. of Cereal Chemists annual convention; Hotel Statler, Buffalo, N. Y.

More Butterfat Research

American Dairy Assn. has announced a new grant of $9,200 to University of Minnesota for continuation of studies on relative dietary qualities of butterfat and vegetable oils.

Studies of this problem, conducted for more than a decade at Minnesota, have proved that vegetable oils or animals fats are not suitable substitutes for butterfat in diets of calves. Studies are to be expanded this year to include small experimental animals to simulate various human diets.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Canned blackberries and other similar berries such as boysenberries, dewberries, and loganberries, revised, proposed, p. 363, Jan. 16 *Federal Register*, written comments received until Feb. 15.

Collard Greens or broccoli greens, new, proposed, p. 425, Jan. 20 *Federal Register*, written comments received until Feb. 19.

Pineapples, revised, p. 533, Jan. 24

Federal Register, effective on Feb. 23.

Dandelion greens, new, proposed, p. 552, Jan. 24 *Federal Register*, written comments received until Feb. 23.

Canned green beans and canned wax beans, amendment of recommended minimum drained weights, p. 641, Jan. 30 *Federal Register*, effective Mar. 1.

Poultry and edible poultry products, grading and inspection regulations, amended, p. 709, Feb. 4 *Federal Register*, effective Mar. 6.

Poultry grading, slightly reducing required number of samples, proposed, p. 733, Feb. 4 *Federal Register*, written comments received until Feb. 19.

Mustard greens and turnip greens, revised, p. 763, Feb. 6 *Federal Register*, effective Mar. 8.

Oranges (California and Arizona), revised, p. 764, Feb. 6 *Federal Register*, effective Mar. 8.

Food Standards Delay

Promulgation of new food standards has been delayed somewhat by the change of administrations in Washington.

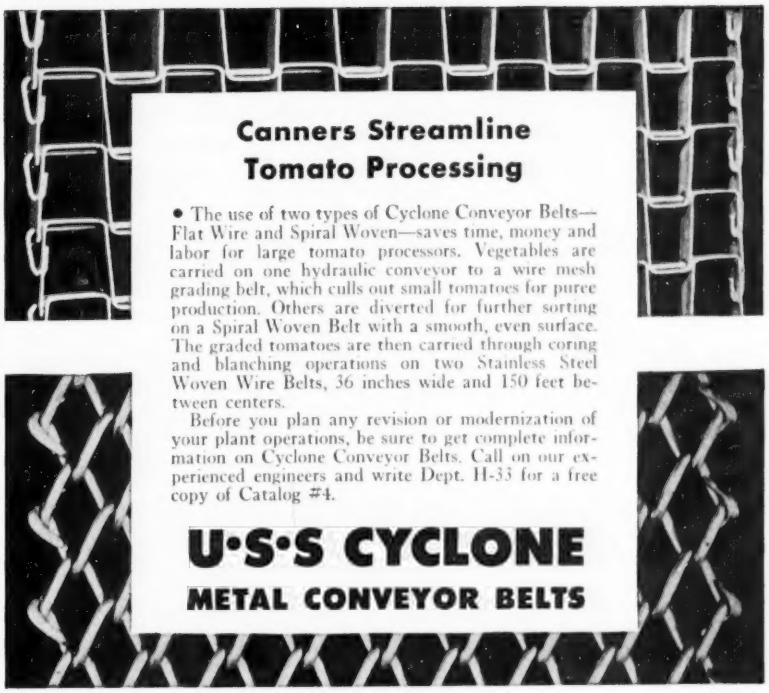
Inasmuch as the final order on *frozen foods* and the tentative orders on *residue tolerances* and *canned pineapple* and *canned pineapple juice* did not appear while Oscar Ewing was still Federal Security Administrator, a reasonable period must be allowed for Mrs. Hobby to read the record on these dockets. Early appearance of the three orders is hoped for.

Next hearing expected is on *canned tuna*, for which an announcement may appear soon. This new standards docket is being initiated by the Administrator. No other hearings appear likely in the near future.

Standards in Courts

Progress has been moderate in various courts where food standards are being considered. Both Glyco Products Co. and Atlas Powder Co. have petitioned the Supreme Court for a writ of certiorari on the *bread* standards decision of the Third Circuit Court of Appeals. The Supreme Court recess from Feb. 9 until Mar. 9 would indicate that a reply before April is unlikely. No date had been set in early February for argument of the *bread* appeal pending in the Eighth Circuit Court.

The *margarine* standard appeal in the Second Circuit Court will be argued on its merits soon, perhaps in April. A motion by FDA to dismiss the appeal was denied by the Court early in February.


Canners Streamline
Tomato Processing
• The use of two types of Cyclone Conveyor Belts—Flat Wire and Spiral Woven—saves time, money and labor for large tomato processors. Vegetables are carried on one hydraulic conveyor to a wire mesh grading belt, which culls out small tomatoes for puree production. Others are diverted for further sorting on a Spiral Woven Belt with a smooth, even surface. The graded tomatoes are then carried through coring and blanching operations on two Stainless Steel Woven Wire Belts, 36 inches wide and 150 feet between centers.
Before you plan any revision or modernization of your plant operations, be sure to get complete information on Cyclone Conveyor Belts. Call on our experienced engineers and write Dept. H-33 for a free copy of Catalog #4.
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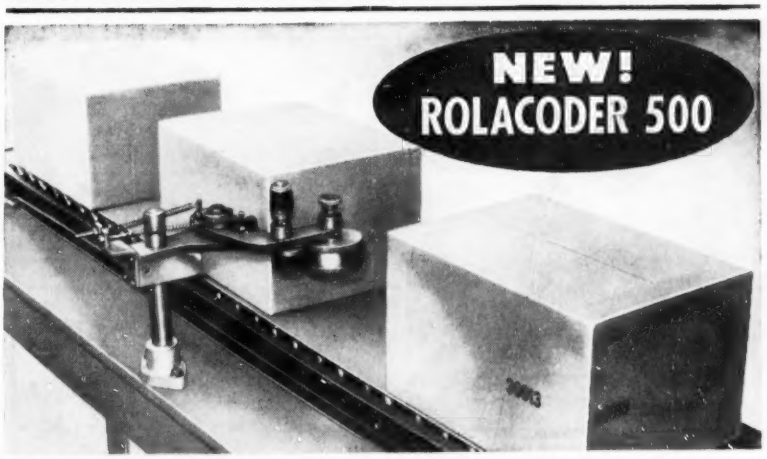
UNITED STATES STEEL



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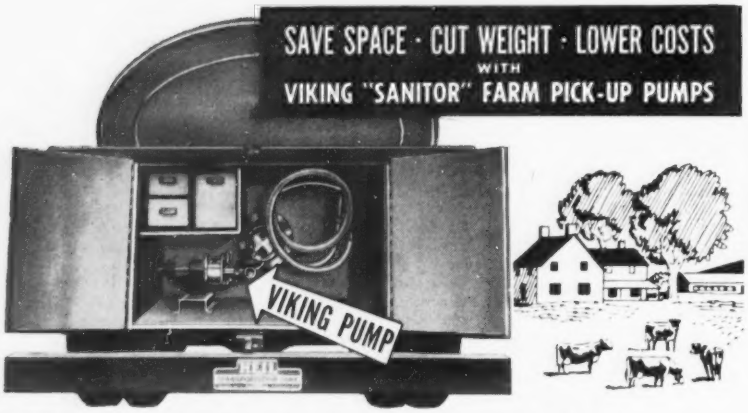
VIKING "SANITOR" FARM PICK-UP PUMPS



VIKING "SANITOR" K-171 PUMP MOUNTED ON A HEIL FARM PICK-UP TANK UNIT

The Viking "Sanitor" has proved to be the preferred farm milk pick-up pump.

Besides the low cost, Viking "Sanitors" take up less space per gallon pumped. Weight of entire unit is cut down over 100 pounds from other conventional units. Correct speed of pump adapts itself to more compact drive equipment.

Made of solid dairy metal, Viking "Sanitor" pumps are 3A approved. Any mounting arrangement is available.

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MUNDET
CORK INSULATION

pH Control Ups Quality

—*Continued from page 67*

held to within 0.1, plus or minus, by the system.

In addition to pH control, an ingenious scheme of liquid-level regulation is also part of the control system. A manometer-type recording liquid-level controller on the panel measures sweet-water level in the large surge vessel by means of a dip-tube and air-bubble system. It thus regulates—by an air-operated valve in the treated water supply line—incoming water to mixing tank in proportion to its use.

Also, supplementary electric contacts are provided in the level controller, and these automatically shut down the water-supply pumps when a predetermined high level is reached.

A fourth instrument on the control panel is a simple indicating-type level gage which measures—also by bubbler-type dip-tube—level in the dilute acid supply tank. While this provision is not used, an electric contact could be supplied in this unit to shut down the supply of agitating air to the mixing tank when dilute acid is not being fed.

As readily seen in this installation, a change in the draw-off rate of treated and pH adjusted water will actually bring the controls into play. Thus, when more water is used, the level control will increase the flow of treated water to the system and cause a trend to lower pH in the mixing tank. However, this trend will be quickly spotted by the glass electrode, and the pH controller will increase dilute acid feed proportionately.

Since variations in water use by the brewery are frequent and over a wide range, an automatic reset function is included in the pH controller to quickly adapt the instrument to such changes in "load".

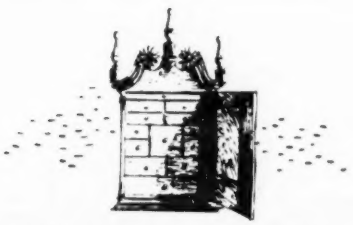
End (*Resume reading on page 67*)

Speeds Whey Handling

—*Continued from page 96*

capacity of 30,000 lb. per hr.—split the product into fat-free whey and whey cream. The cream, which comes in a small trickle, is run through pipe into a coil vat, where it is cooled and stored until subsequent pasteurization and churning into high-score butter.

Fat-free whey from separation is cooled by a 30,000-lb./hr. plate unit using well water as coolant. Then the byproduct drops directly through pipe below the floor and into a 150-ft. long glass pipeline that runs through an underground tunnel to condensory.



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Here's "plus-performance" equipment that steps up food handling efficiency right down the line—from hopper to shipping room. It's adaptable to every process. And rugged LaPorte Flexible Steel Conveyor Belting requires *less maintenance,* which means faster processing . . . greater profits for you.

LaPorte FLEXIBILITY eliminates creeping, weaving or jumping by allowing a tighter grip of belt on friction drum. Insures perfectly flat surface for containers, empty or filled. STEEL MESH CONSTRUCTION withstands heaviest loading impacts. This open mesh also provides for greater circulation of air and liquids around products in process . . . facilitates cleaning. Highly resistant to heat and cold. Choose LaPorte for dependable, "plus" service for years to come.

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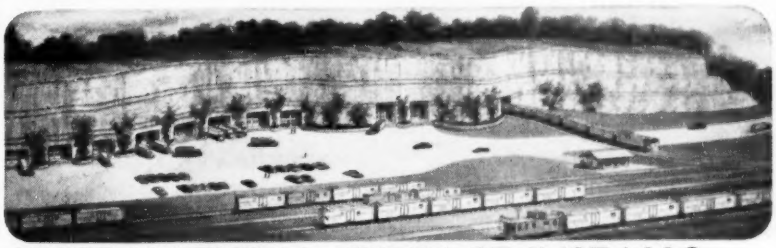
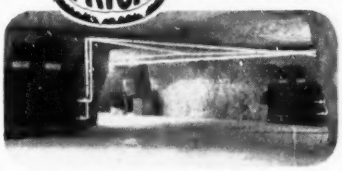
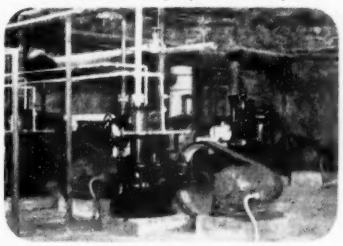


HUGE NATURAL STORAGE INSTALLS REFRIGERATION THROUGHOUT

FRICK



Two of the 28 Frick air units which cool 2,428,875 cubic feet of storage space at Coldspur.



Three of the four Frick ammonia compressors used by the Natural Storage Co., Coldspur, Kan.

Nearly two and a half million cubic feet of refrigerated space in this former limestone quarry at Coldspur, Kansas, are held at temperatures between −10 and +40 degrees by four Frick compressors and 28 Frick air cooling units.

Thus another important plant is added to the list of cold storages that have selected Frick refrigeration equipment for its dependability and economy.

For competent assistance on air conditioning, process work, cold storage, ice making, quick-freezing, or other refrigeration projects, get in touch with your nearest Frick Branch or Distributor. They're in principal cities everywhere.

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Metso® cleaners

Built at the same time as the Lake-to-Lake operation, the Western Condensing plant enjoys more than just the benefits of a large and ready quality supply of whey. Also supplied are skim milk, water, and sweetwater. In return, the condensory operates a boiler room sized for both plants and supplies steam—again through the tunnel—to its neighbor. Both steam and water consumption are reciprocally sold on a cost basis through meter reading, and steam condensate is tunnel-returned to the boiler room to reclaim its Btu.'s.

In the tunnel, two permanent glass lines connect the plants. Thus the system constitutes a loop, enabling in-place cleaning. However, the extra pipe is also used to carry skim milk when whole milk is being separated.

End (Resume reading on page 97)

Tells Right Carton Size

—Continued from page 79

straight-edge to touch the other scales.

This chart is based on a mathematical relationship between the three dimensions—length, width, and depth—for the least possible surface area of a container to enclose a given volume. This relationship, determined through application of the maxima and minima theory of differential calculus, is expressed by this formula:

$$\tfrac{1}{2}L = \tfrac{1}{2}d = w\sqrt[3]{\frac{V}{4}}$$

where L equals length of inside dimensions of container,
w equals width of inside dimensions of container,
d equals depth of inside dimensions of container,
V equals volume of container.

Cost is a direct function of the surface area of the cardboard used. From the above formula, this general law can be predicated—

The length and depth should be as nearly equal as possible and each should be double the width to obtain the container at minimum cost.

The area A for the material in the container can be obtained from—

$$A\ 2(3w)^2$$

The two small drawings in the center of our nomograph show how the cardboard of the carton should be folded. The container is formed by taping the edges of the side and end together. End flaps should be turned in, with the side flaps folded on top of them to complete the container.

When the dimensions of the flaps equal one-half the width of the side, the flaps will meet in the center of the top and bottom sides of the container.

End (Resume reading on page 80)

Recent Inventions

PRODUCTS

Liquid Dessert Mix Comprising Emulsion to Incorporate and Hold Air When Whipped and Frozen Consisting of Edible Water-Soluble Protein, Carbohydrate, Pure Refined Fat, and Stabilizer—*H. W. Diamond, Whiting, Ind. No. 2,619,422. Nov. 25, 1952.*

Preserved Coffee Beverage Composed of Solid Particles Introduced Into Water in Sealed and Sterilized Container—*W. A. Heyman, Lawrence, N. Y. No. 2,620,276. Dec. 2, 1952.*

Dried Honey-Milk Product Prepared by Mixing Dry Milk With Honey and Holding Until Water is Taken up as Crystalline Sugar Hydrate—*B. H. Webb, Kensington, Md. and G. P. Walton, Washington, D. C. to USA. No. 2,621,128. Dec. 9, 1952.*

Stable Oil-In-Water Fat Emulsion Comprising Semi-Solid Fat, Sodium Caseinate, Water in Sterile Condition and Neutral pH—*D. D. Peebles, Hilsborough, and M. D. Girvin, San Anselmo, Calif. to Western Condensing Co., San Francisco. No. 2,622,984. Dec. 23, 1952.*

Dry Breading and Batter Mix for Preventing Dehydration of Foods During Cooking Containing Dehydrated Pureed Extract Prepared From Aqueous Solution of Pectic Substance—*D. K. Tressler, Westport, Conn., and P. T. Breithaupt, Scarborough, Ontario, Canada to P. T. Breithaupt. No. 2,623,825. Dec. 30, 1952.*

PACKAGING

Apparatus for Assembling Multiple Part Egg Containers and Like—*S. Bergstein, Cincinnati, Ohio. No. 2,615,378. Oct. 28, 1952.*

Apparatus for Moving Cans Through Large Diameter Filler Followed by Small Diameter Closing Machine Turret—*J. Simpson, Elmhurst, Ill. to Continental Can Co., Inc., New York. No. 2,621,841. Dec. 16, 1952.*

Can Filling Machine Employing Nozzle Discharging Into Head Containing Plurality of Can Sized Containers, With Means for Injecting Steam Into Foodstuff When Being Compacted in Nozzle—*D. M. McBean, Rochester, L. C. Tallman, Churchville, and R. E. Mover, East Rochester, N. Y. to McBean Research Corp., Rochester. No. 2,621,844. Dec. 16, 1952.*

Disposable Carton Mold Box for Frozen Confections—*W. Hammond, Salt Lake City, Utah. No. 2,622,784. Dec. 23, 1952.*

Coffee Cream Package Composed of Bag of Oil-Resistant, Heat-Sealable, Plastic Film and Circumferential Fibrous Stiffening Element—*J. E. Snyder and B. J. Avant to Wingfoot Corp., Akron, Ohio. No. 2,622,986. Dec. 23, 1952.*

Machine for Forming Rectangular Blank Into a Top for Elongated Box and Automatically Closing the Container—*J. Reimer to Kraft Foods Co., Chicago. No. 2,623,338. Dec. 30, 1952.*

Packaging Meats in Pliable Flexible Container Utilizing High Vacuum Followed by Back-Filling to a Lower Pressure With Inert Gas—*S. R. Grinstead, Whiting, Ind. to Swift & Co., Chicago. No. 2,623,826. Dec. 30, 1952.*

PROCESSES

Recovering Waste Values From Cantaloupe by Grinding to Puree, Mixing With Neutral, Soluble Calcium Salt, Heating, Mechanically Separating Juice and Solid Components—*G. E. Van Atta, Sebastopol, Calif. to the U. S. A. No. 2,617,728. Nov. 11, 1952.*

Separating Butterfat From Globules by Dispersing Proteinacious Membranes of Such Globules to Permit Butterfat Constituents to Coalesce—*S. Patton, and C. M. Stine, State College, Pa. to The Pennsylvania Research Corp. No. 2,617,731. Nov. 11, 1952.*

Preparing Frozen Prunes by Contacting With Hot Moisture-Saturated Air in Three Stages, Adding Hot Syrup, Holding, Freezing—*J. M. Mills, Jr. and J. M. Mills, III, Hamilton City, Calif. No. 2,618,564. Nov. 18, 1952.*

Improving Storage Properties of Dehydrated Carrots by Moistening Before Dehydrating to Below 10 Percent—*M. P. Masure, El Cerrito, Calif. to USA. No. 2,619,424. Nov. 25, 1952.*

Drying and Defatting Animal Tissue by Azeotropic Distillation Using Water-Immiscible Fat Solvent Below 100 deg. C.—*E. Levin, Champaign, Ill. No. 2,619,425. Nov. 25, 1952.*

Stabilizing Brewed Malt Beverages Against Oxidation by Adding Catalase Material and Compound Having Reducing Properties Characterized by the En-Doil Group—*P. P. Gray, Forest Hills, N. Y. to Wallerstein Co., Inc., New York. No. 2,620,275. Dec. 2, 1952.*

Preserving Raw Peeled White Potatoes by Treatment With Acid Aqueous Solution of Sulfur Dioxide Prior to Storage Under Refrigeration—*C. Scalera, Provi-*

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Solves your Cleated Belt problems with 40 types of Champion Belting to handle *a variety of products.* T-Cleats cannot pull out and will flex around pulley diameters compatible with weight of Champion Belting used. As stiff or flexible as desired.

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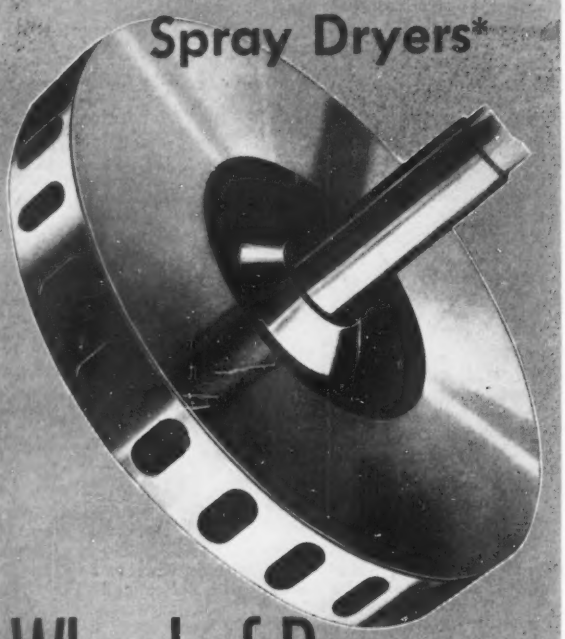

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dence, R. I. to A. Longo, Cranston, N. Y. No. 2,620,277. Dec. 2, 1952.

Preparing Juices From Fruits by Immersion in Prepared Invert Sugar Solution to Draw Out Juice by Osmosis—H. Pirhonen, Mustiala, Finland. No. 2,620,278. Dec. 2, 1952.

Extracting Irish Moss by Soaking Dried Sea Plants in Aqueous Solution of Sodium Salt, Draining, Cooking in Water, Separating and Removing Water—E. K. Nielson, Lake Villa, and N. R. Pellicani, Freeport, Ill. to Kraft Foods Co., Chicago. No. 2,620,334. Dec. 2, 1952.

Dehydrating and Curing Green Vanilla Beans by Reducing to Puree Pulp and Heating in Air—L. V. Towt, Los Angeles, Calif. to McCormick & Co., Baltimore, Md. No. 2,621,127. Dec. 9, 1952.

Baking Leavened Bread Dough by Enclosing in Container Under Pressure, Employing Moderate Bottom Heat and Intense Downward Radiant Heat—B. Ames, Boston, Mass. No. 2,621,616. Dec. 16, 1952.

Treating Animal Bones by Crushing and Disintegrating to Gelatinous Mass at a Temperature to Effect Hydrolysis of Protein With Inorganic Constituents Having Particle Size of About 10 Microns—D. Torr, New York to C. J. Ely, Oakland, N. J. No. 2,622,027. Dec. 16, 1952.

Retarding Decomposition of Food With Bacteriostatic and Fungicidal Solution Containing Maleic Acid, Boric Acid, and Sodium Benzoate—L. Frandsen to Washington Laboratories, Inc., Seattle, Wash. No. 2,622,031. Dec. 16, 1952.

Treating Dried Fruits That Normally Display Surface Sugar Crystallization by Coating With Waxy Corn Starch—C. J. Fusco, San Francisco, Calif. No. 2,622,033. Dec. 16, 1952.

Processing Raw Shrimp by Flotation Separation of Ice, Removing Heads, Tails, Shells and Intestines, Chilling in Ice, Packing in Transparent Vapor-Moisture-Proof Bag, Heat Sealing, Boxing, Freezing—J. H. Wills, Charlotte, N. C. No. 2,622,034. Dec. 16, 1952.

Branding Animal Liver With Heated Indicia Surface at 450-600 deg. F. Under Slight Pressure to Sear Tunica Serosa Layer—C. A. Rinehart and R. O. Mertens to Swift & Co., Chicago. No. 2,622,513. Dec. 23, 1952.

Extraction of Solids From Whey With Acetone and Water to Remove Objectionable Flavor—S. C. Stevens, Dayton, Ohio to Swift & Co., Chicago. No. 2,622,982. Dec. 23, 1952.

Processing Whole Sweet Milk by Adding Edible Hydrogen Peroxide and Milk Sugar Prior to Canning—L. T. Winger, Sr., Trinidad, Colo. No. 2,622,983. Dec. 23, 1952.

Puffing Cereal Grains by Passage Through Elongated Zones Under Steam Pressure and Utilizing High Velocity Steam to Discharge Grains Through Orifice at Outlet End—C. F. Haughey, Battle Creek, and R. T. Erickson, Climax, Mich. to General Foods Corp., New York. No. 2,622,985. Dec. 23, 1952.

Evaporation and Drying of Glue Water From Sea Animals to Form Solid Cattle Food Comprising Mechanical Separation Under Heat, Atomizing Liquid and Drying in Hot Gas—M. Fladmark, Oslo, Norway. No. 2,623,298. Dec. 30, 1952.

EQUIPMENT

Apparatus for Separating Fish From Packing Ice Employing Grated Conveyor Series for Gravity Removal of Ice and Trash—T. S. Gorton, Evanston, Ill. No. 2,617,532. Nov. 11, 1952.

Machine for Cleaning, Preserving Eggs, by Spraying With Heated Mixture of Sand and Water, Warm Water Washing, Hot Air Drying, Sterile Oil Spraying—H. A. Mulvany, Berkeley, Calif. No. 2,618,216. Nov. 18, 1952.

Peach Pitting Device Employing U-Shape Cutter,—Top and Bottom Cooperating Knives—L. Vanderhoofven, Delta, Colo. No. 2,618,305. Nov. 18, 1952.

Sorting Fruits, Vegetables According to Shape by Rotation and Removal of Unstable Articles From Supported Positions—R. M. Magnuson, Campbell, Calif. No. 2,618,306. Nov. 18, 1952.

Fruit Inspection, Grading System Employing Horizontal Conveyor With Deflecting Means and Series of Extending Grading Passageways—R. C. Paulus, Portland, Ore. No. 2,618,387. Nov. 18, 1952.

Apparatus for Forming Frozen Confections Employing Multi-Compartment Mold to Hold Wafers for Single-Unit-Freezing With Interposed Ice Cream—P. I. Henderson, Charlotte, N. C. No. 2,619,046. Nov. 25, 1952.

Forming Die for Shaping Macaroni Into Animal Figures—T. J. Viviano, Greentree, Pa. to Zoo-Mac, Inc., St. Louis. No. 2,619,049. Nov. 25, 1952.

Cutting and Spreading Machine to Handle and Dispose of Dough on Peel Boards in Continuous Fashion—P. Kellner to Dukay Machinery Corp., New York. No. 2,619,052. Nov. 25, 1952.

Machine for Grating Citrus Peel Employing Rotating Grater Cylinder and Plurality of Radially Spaced Feeding Vanes—H. M. Riggle, Dunedin, and W. B. Rose, Clearwater, Fla. to Extrac-

tion, Inc. (A. Del. Corp.). No. 2,619,139. Nov. 25, 1952.

Apparatus for Treating Solid Collagen Bearing Material to Produce Aqueous Solution of Gelatin Comprising Closed Pressure Vessel With Internal Pipe Arrangement for Jetting Processing Fluid Into it.—*N. C. Hill and J. E. Hill, Akron, Ohio to N. C. Hill. No. 2,619,413. Nov. 25, 1952.*

Mechanism for Feeding Container-Handling Machine Employing Rotating Horizontal Base Plate—*M. O. Smith and R. Elsheimer, Hoopeston, Ill. to Food Machinery & Chemical Corp., San Jose, Calif. No. 2,620,058. Dec. 2, 1952.*

Machine for Making Hot Tamales and Similar Food Products Employing Screw Conveyors and Radial Propellor Blades to Force Finely Divided Product Into Casing—*F. L. White; B. White, Executor, to A. A. White, and E. E. Michael, Dallas, E. M. Hermann, Houston, Texas. No. 2,620,173. Dec. 2, 1952.*

Coffee Roaster With Automatic Control of Oven Temperature and Air to Combustion Chamber—*R. J. Gorman, Glendale, and J. W. Binsack, Staten Island to Beech Nut Packing Co., Canojaharie, N. Y. No. 2,620,176. Dec. 2, 1952.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Device for Removing Lining of Poultry Gizzards—*M. I. Darrow, Chicago, G. R. Biddinger, Forest Park, and W. J. Patterson, La Grange, Ill. to Swift & Co., Chicago. No. 2,620,510. Dec. 9, 1952.*

Doughnut Machine Employing Endless Conveyor to Carry Baking Pans Between Heating Elements—*J. Morley, Los Angeles, Calif. to M. F. Morley. No. 2,620,723. Dec. 9, 1952.*

Continuous Slicing Machine for Conveyor-Borne Slabs of Bar Candy—*R. F. Morrison, Oak Park, and E. C. Clement, Chicago to Mars, Inc. No. 2,620,753. Dec. 9, 1952.*

Apparatus for Stunning Poultry by Contact With Resilient Electrodes While Suspended by Insulator From Conveyor—*G. C. Cosden to Sussex Poultry Co., Inc., Milford, Del. No. 2,621,362. Dec. 16, 1952.*

Ideal for Dairy and Food Industries

The Strahman Spray Nozzle does a better job with the least amount of water. This precision made nozzle enables the operator to get any type stream of water to do his job by simply pressing the lever. A soft spray is sent forth with slight pressure on the lever, and a strong straight stream may be had by pushing the lever all the way down. This convenient control of the wash water assures better cleaning with a lot less effort. The nozzle automatically shuts off the moment the lever is released, thereby eliminating all waste of water.

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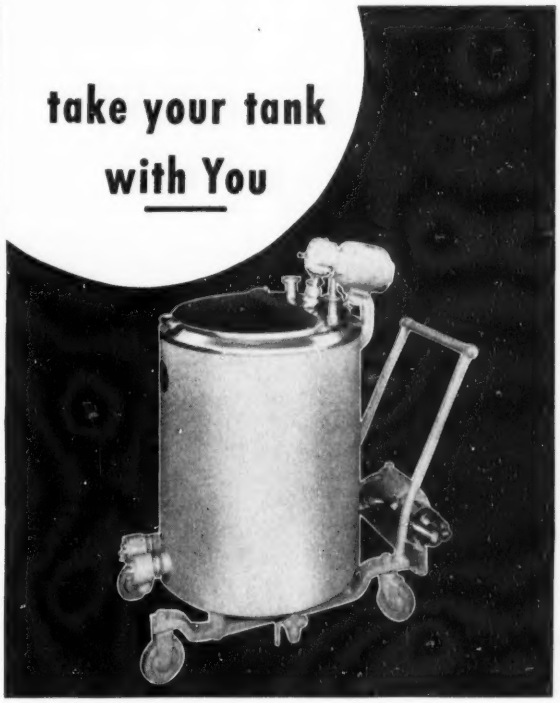

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Mix your product in this portable Cherry-Burrell Rollaway Univat and heat with either steam or electricity . . . pull it to any desired point in your processing system for unloading . . . and you can count on improved product quality and flavor.

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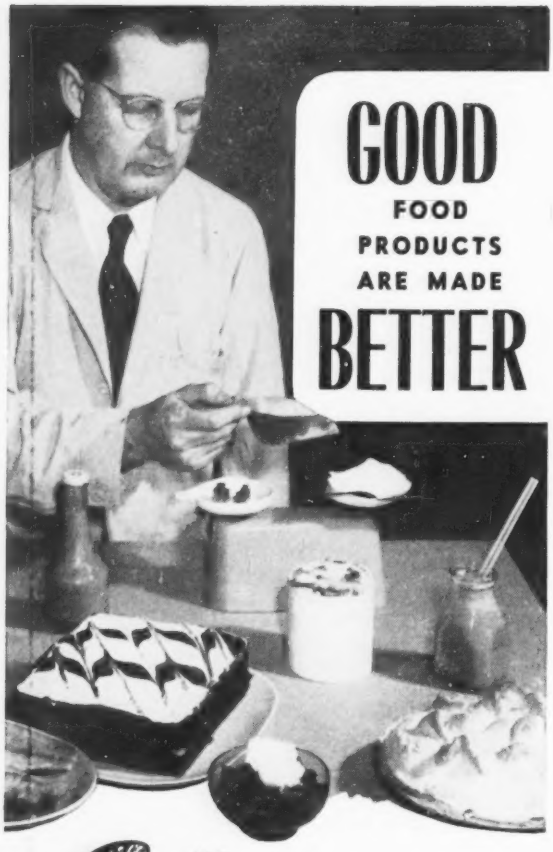

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Does your product have all the appetite and sales appeal it needs? . . . Can your manufacturing process be simplified or speeded up? . . . Has a really tough improvement problem got you ready to throw in the towel?

Then it's time right now to discover how SeaKem Stabilizers can help you.

The check list at right shows a few of the positive ways these remarkable colloids are improving dozens of items as widely varied as bakery product stabilizers, chocolate milk, dessert mixes, ice cream stabilizers, pet foods, pie fillings (fruit), puddings, sauces, sausages, and syrups.

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Here are a few of the functions being performed by SeaKem Stabilizers for an ever-growing list of food products:

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- Bodying
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- Gelling
- Modifying
- Stabilizing
- Suspending
- Thickening
- Custardizing milk and products containing milk solids
- Improving mouth feel and flavor
- Increasing efficiency of component ingredients
- Modifying ice crystal growth
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* SeaKem is the registered trademark for the standardized, water-soluble, sea plant extractives manufactured by the Seaplant Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for use in either dry or liquid applications, SeaKem Stabilizers have won acceptance on the basis of proven advantages with leading food manufacturers and processors.

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SEAPLANT CHEMICAL CORPORATION
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Men & Companies

Richard Prince was recently elected president of Gottfried Baking Co. and its subsidiary, Hanscom Baking Corp. Subsequently, he announced appointments of Wilson J. Dilworth as executive vice-president of the retail chain and marketing division, and Bernard S. Budny as vice-president in charge of Gottfried operations.

Industry

American Institute of Baking's department of bakery sanitation recently held its fifth annual conference in Chicago to outline department activities for 1953.

Canadian Canners Ltd., Hamilton, Ontario, has appointed William Innes Drynan president and G. G. Lister as executive vice-president.

Canada Safeway Ltd. plans its own $250,000 milk processing plant in Vancouver, British Columbia.

Coca-Cola, Ltd., Toronto, will construct $1,500,000 bottling plant near Loyola College, Montreal.

First Spice Milling Co. of New York City has built an ultra-modern plant in Toronto to house First Spice Mixing Co. of Canada Ltd.

General Baking Corp. has purchased a site near Whitney, S. C., for establishment of plant to serve the Southeast.

General Mills' Sperry Div. is closing a third of its Tacoma, Wash., mill facilities due to "deterioration of the export market."

Gerber Products Co. has selected St. Joseph, Mo., as the site of an in-transit distribution warehouse. It will have an estimated 80,000 sq. ft. of floor space.

Hines-Park Foods, Inc., at a meeting of company's board, announced re-election of Roy H. Park as president and James H. Black as vice-president.

Lady's Choice Fine Foods, San Francisco, has acquired the Hayward, Calif., modern pickle processing plant that had been part of the John Haar interests, and will begin expansion.

Michigan Bakeries announces appointment of C. E. Kincaid as general manager, and George E. Menard as plant manager of the Grand Rapids bakery.

National Biscuit Co. has moved bakery operations from its plant in Detroit to a new plant in Chicago.

National Potato Chip Institute, at its annual conference, elected Robert H. Cain president, and re-elected Harvey F. Noss as executive vice-president.

Quaker Oats Co., Chicago, has reorganized its production and engineering departments, setting up the latter as a separate unit.

Realemon-Puritan Co. has acquired processing and packing facilities of Paramount Citrus Assn.'s San Fernando plant.

Salgado & Cia., Madrid, has been elected to active membership in Olive Oil Assn. of America, Inc.

Lt. Col. George F. McAneny has assumed command of Quartermaster Food & Container Institute for Armed Forces, Chicago. He has served with Research & Development Div. of the Office of the Quartermaster General and also as executive officer of the Quartermaster School, Darmstadt, Germany.

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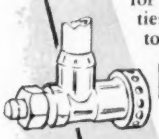

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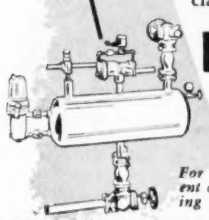

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(3) *Finishes up to 36,000 packages per 8 hour shift.*

Whether your product is solid, liquid, powder, or multiple items, the Bartelt Packager will place the desired quantity in a bag made of any type of heat sealing material. Various types of feeds are available to handle products from hardware to soup mix.

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Let's assume you're a Conveyor-Project Engineer employed by Hapman —

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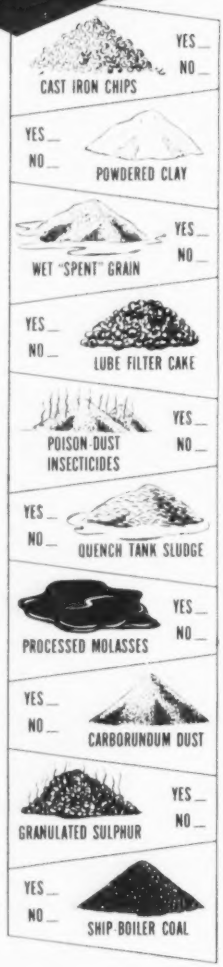

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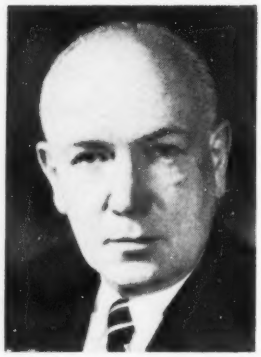

Albert E. Repenning, vice-president of Interamerican Orange Crush Co., has been elected director of National Can Corp.

Schoenith Candy Co., Charlotte, N. C., suffered $50,000 damage and two employees were injured in the recent explosion of a gas oven.

Sugar Research Foundation, Inc., has appointed Herstein Laboratories as a screening laboratory for projected foundation studies.

Skybrook Farms, Inc., food freezing concern of Hendersonville, N. C., has been purchased by Frank O. Sherrill, president of S & W Cafeterias, Inc. Price was $310,000.

National Dairy Corp. has formed a subsidiary, Sheffield Chemical Co., with headquarters at Norwich, N. Y.

Personnel

Frank G. Arnold is new president of Canadian Doughnut Co., Ltd., subsidiary of Doughnut Corp. of America.

Dr. M. J. Blish, noted for research in cereal technology and proteins, has received University of Minnesota's outstanding achievement award.

Paul R. Dew has been named manager of Fairmont Foods Co.'s Michigan operations.

Andrew H. Heide, former vice-president and secretary of Henry Heide, Inc., has been elected executive vice-president.

J. William Hersey, board chairman of General Bakeries Ltd. and Orange Crush Ltd., has been elected a director of the Imperial Bank of Canada.

Dean Johnson replaces Bernard Davitto as director of Italian Swiss Colony.

Frederick R. Kohn of Old Dutch Coffee has been elected president of the New York Coffee Roasters Assn.

Harold S. Mitchell, director of laboratories for Swift & Co., has been elected assistant vice-president by the board.

Edward S. Moore, Jr., executive vice-president of the National Biscuit Co., is now a director of Republic Aviation Corp.

C. E. Nelson, vice-president in charge of processing of Kraft Foods Co., is new president of Ovson Co., a subsidiary of National Dairy Products Corp.

Marvin J. Nyby has been promoted to branch manager of Borden Co.'s Pacific cheese division.

Dr. C. I. Post is newly elected vice-president of Nopco Chemical Co., vitamin manufacturer.

H. J. Scharpou has been promoted from manager of Kraft Foods Co.'s St. Louis office to manager of company's Detroit office.

Robert B. Schnering has succeeded his father, the late Otto Schnering, as president of Curtiss Candy Co.

Emil G. Sick, president of Sicks Brewery Enterprises, Inc., was re-elected to board of United States Brewers Assn.

G. C. Simms has assumed duties as manager of Swift & Co.'s Richmond, Va., branch.

Carl Smith, recently appointed produce manager of Gerber's Baby Foods' Rochester plant, has been named a member of Gerber's agricultural advisory committee.

L. V. Tharpe, former assistant superintendent, has been

Lincoln C. Mazzola, former research sales engineer of Snider Packing Corp. and editorial staff member of *Food Industries*, is new vice-president in charge of sales of J. Lyons & Co., Ltd., Inc. He will oversee all sales activities in the U. S.

Dr. F. Eugenia Whitehead, director of nutrition for Wheat Flour Institute, addressed the recent First Inter-Industry Conference on Consumer Relations, sponsored by American Institute of Baking, on the subject of research carried out through grants to colleges and universities.

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appointed superintendent of Fine Products Corp., Augusta, Ga.

H. MacGregor Tuttle, Jr., is newly appointed manager of the field and promotion department of National Confectioners Assn.

Bertram B. Warren, treasurer of General Foods Corp., has accepted chairmanship of Consumer Goods & Services Section, New York Chapter of the American Red Cross.

Associated Industries

American Can Co.'s president, William C. Stolk, announced establishment of new company, Envases Venezolanos, S. A., in May. Capitalization: $2,212,121.

Baker-Raulang Co., manufacturer of industrial lift trucks, tractors, cranes, has purchased Lull Mfg. Corp., Minneapolis, and will operate it as a subsidiary.

Beckman Instruments, Inc., started three-month training program for 21 new sales engineers, who will render specialized technical service to processors.

Chain Belt Co. of Milwaukee has appointed Luther H. Bosnian as vice-president in charge of manufacturing facilities.

Chicago Metallic Mfg. Co. of Chicago, manufacturer of pans for baking plants, has named Leonard B. Weislow vice-president and director of bakery sales.

Continental Can Co. is pushing completion of its new $2,000,000 plant near Vancouver, British Columbia.

Dixie Wax Paper Co., Dallas, has opened a third plant in Washington, N. J., to serve customers in the East.

Hunter Mfg. Co., has appointed Donald L. Chadwick and Walter E. Brown as field engineers in the Midwest and Northeast.

Kraft Container Corp. of Dallas has elected W. B. Scott and C. W. Dodgen, vice-presidents, to its board.

National Container Corp., maker of shipping containers and paper products, has purchased Empire Box, Inc., Atlanta.

Parker Appliance Co.'s Cleveland Valve Div. has named Walter C. Loeman as production manager and Robert C. Dyrenforth as division engineer.

Sterwin Chemicals Inc., subsidiary of Sterling Drug Inc. and a pioneer in food enrichment, will establish a new company in Canada.

United Can & Glass Co., Hayward, Calif., has named Carl Kalbfleisch executive vice-president.

Deaths

Louis R. Appleton, 58, general production manager for B. Manischewitz Co.—Jan. 19.

George A. Ball, 67, former manager of Carnation Co., Ltd., and manager of Lockshore Farm Dairy.—Jan. 15.

Arnold W. Dykeman, 57, manager of National Packing Co. Ltd., St. John, New Brunswick.—Jan. 17.

C. Robert Edwards, 85, president of Empire State Canning Co., and member of New York Canners & Freezers Assn. and National Canners Assn.—Jan 26.

Nellie D. Lenahan, 72, president and board chairman of August Wagner Breweries, Inc.—Jas. 18.

John H. McManus, 62, former general manager of Swift & Co. packing plants in Cambridge and Somerville, Mass. —Jan. 27.

George M. Neal, 74, former foreman of Quaker Maid Co., plant in Brockport, N. Y.—Jan. 22.

E. S. Stateler, 62, vice-president of Wahl-Henius Institute, Chicago, and former associate editor, FOOD ENGINEERING.—Feb. 2.

Cut Food Product Costs with PAYGEL

(A WHEAT STARCH)

Write for FREE sample and verify PAYGEL savings!

Better food products at less cost, with Paygel. That's what other food processors are getting . . . and YOU can too! Prove it for yourself in your products with a free sample of this superior wheat starch. Here are just two of many examples of improvements food processors have found resulting from the use of PAYGEL:

Salad Dressing: PAYGEL makes possible a 5 to 7% total starch reduction and replaces a blend of starches as an ideal dressing stabilizer. PAYGEL-based dressings retain their initial body without breaking down or thinning.

Soups: Up to 15% less PAYGEL may be used to replace ordinary thickeners in canned soups. Has excellent flavor retention characteristics and remarkable fat dispersion properties.

PAYGEL, a thick-boiling starch also gives good results in pie fillings, caramel confections, dessert mixes, custards, canned specialty foods. TRY IT at our expense!

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Special Commodities Division

For more information, use coupon on page 157.

"I could see the corpsman kneeling over me. The blood plasma was running down through a tube into my arm and he said everything was going to be O.K. I was walking across an enemy mine field in Seoul when one exploded and a piece of shrapnel caught me in the leg.

"'Got enough of that stuff?' I asked him, pointing to the blood. 'I guess we never have enough,' he said, 'but you can thank *somebody* for this pint.'

"How do you thank 'somebody' for blood? For saving your life? When I got back home, I discovered the answer at my local blood donor center. There's only *one* way to say thanks—by giving some of your own blood."

"How do you thank 'somebody' for Blood?"

Yes, all kinds of people give blood—for all kinds of reasons. But whatever *your* reason for giving blood, this you can be sure of: Whether your blood goes to a combat area, a local hospital, or for Civil Defense needs—this priceless, painless gift will some day save an American life!

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

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National Blood Program

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New Catalogs and Bulletins
from manufacturers of equipment and supplies
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Food Plant Equipment

Curd Concentrator

Leaflet explains use of curd separator in production of baker's cheese.—*De Laval Separator Co., Poughkeepsie, N. Y.*

Circle 207A on Reader Service Card

Vertical Pumps

Bulletin 52B6975A describes construction features of small vertical pumps for sidewall or submerged mounting. 8 pages—*Allis-Chalmers Mfg. Co., Milwaukee 1.*

Circle 207B on Reader Service Card

Liquid Packaging

Packaging of liquid type products is dealt with in leaflet.—*Transparent Wrap Machine Corp., Route 17, Hasbrouck Heights, N. J.*

Circle 207C on Reader Service Card

Hand Pumps

Bulletin HP206 deals with hand pumps for use in moving oils, syrups, and industrial liquids. 6 pages.—*Blackmer Pump Co., 1809 Century Ave., S.W., Grand Rapids 9.*

Circle 207D on Reader Service Card

Speed-Reduction Units

Dimensions, photos and charts provide detailed data in bulletin on shaft-mounted speed reduction drives. 20 pages.—*American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29.*

Circle 207E on Reader Service Card

Speed Adjusters

Miniature variable speed changers weighing 6 oz. are described in leaflet.—*Metron Instrument Co., 432 Lincoln St., Denver 9.*

Circle 207F on Reader Service Card

Air Compressors

Oil-free air compressors are treated in pamphlet emphasizing use in plants where oil must not contaminate compressed air.—*Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22.*

Circle 207G on Reader Service Card

Enclosed Motors

Safety, longer life are accented as advantages of totally enclosed motors described in illustrated Bulletin 1784. 8 pages.—*U. S. Electrical Motors, Inc., Los Angeles 54.*

Circle 207H on Reader Service Card

Cooking Utensils

Heavy-duty range utensils, steam-jacketed kettles, urns, cutlery, and food industry equipment, are dealt with in indexed catalog. 76 pages.—*Aluminum Cooking Utensil Co., New Kensington, Pa.*

Circle 207I on Reader Service Card

Heat Transfer

Illustrations, tables, and supplementary data on heat transfer equipment, from condensers to valves, are offered in catalog.—*Standard Refrigeration Co., 332 S. Hoyne Ave., Chicago 12.*

Circle 207J on Reader Service Card

Industrial Pumps

Catalog 1-52 provides sectional, exterior views of pumps, together with selection tables, other data. 95 pages.—*Deming Co., Salem, Ohio.*

Circle 207K on Reader Service Card

Bottle Fillers

Bulletin G-476 covers filler models handling round, square, rectangular milk bottles, jugs, or cans. 8 pages.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.*

Circle 207L on Reader Service Card

Heating Units

Use in bottling plants of gas-burning, automatic heating units is covered in leaflet.—*G. C. Evans Sales Co., Little Rock, Ark.*

Circle 207M on Reader Service Card

Boiler-Burner Units

Data on new line of boiler-burner units for high or low pressure heating, power, and process steam, is offered in colorful catalog. 14 pages.—*Kewanee-Ross Corp., Kewanee, Ill.*

Circle 207N on Reader Service Card

Anent Valves

Indexed catalog offers information on line of valves made of cast steel, forged steel, iron, and bronze. 22 pages.—*Ohio Injector Co., Wadsworth, Ohio.*

Circle 2070 on Reader Service Card

Processing Vats

Bulletin G-472 carries illustrated information on line of multi-purpose, heavy duty processing vats. 12 pages.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.*

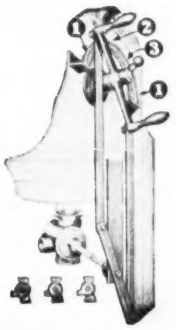
Circle 207P on Reader Service Card

GP Pumps

Construction features of supporting-adapter type, close-coupled, general purpose pumps are covered in Bulletin 52B6083A. 6 pages.—*Allis-Chalmers Mfg. Co., Milwaukee 1.*

Circle 207Q on Reader Service Card

DON'T LOSE PROFIT DOWN THE SEWER!



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Stop wasting valuable product. Langsenkamp three-way valve provides positive one-point control. Eliminates loss of product by accidental releasing of old time tank plug, and prevents possibility of back pressure lifting plug permitting raw stock entering filler line.

Install Langsenkamp 3-way valve . . . supplies positive one-point control and saves time as well.

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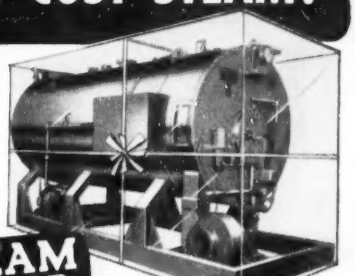

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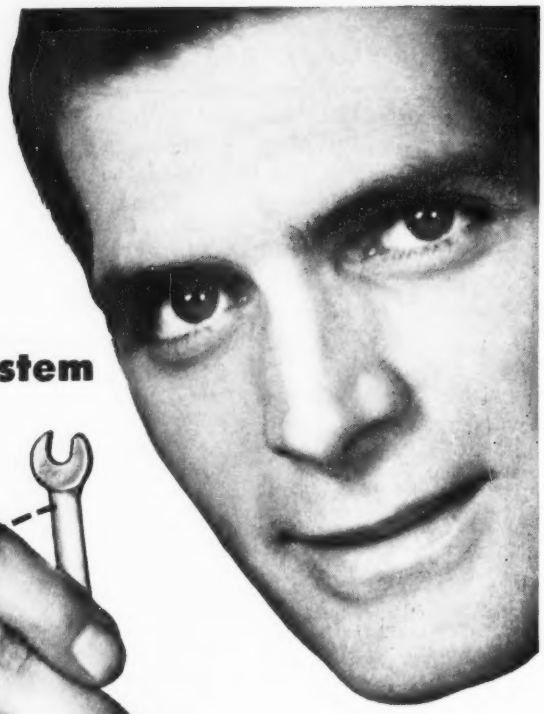

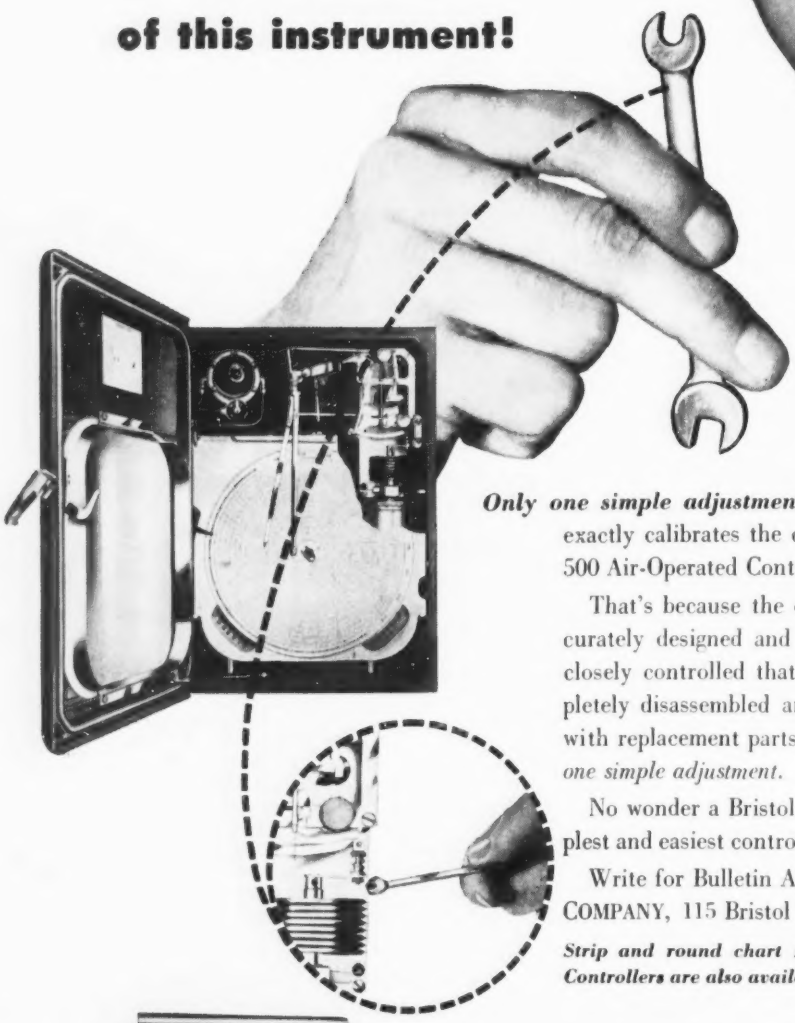

Only one simple adjustment with a standard 1/4 in. wrench exactly calibrates the control system in a Bristol Series 500 Air-Operated Control System.

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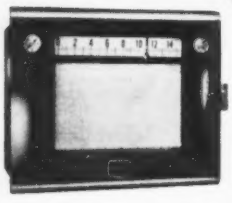

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AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Production Separator

Colorful bulletin describes separator for wet or dry screening. 8 pages.—*Separator Div., Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 58.*

Circle 209A on Reader Service Card

Chemical Pumps

Rubber-lined chemical pumps are detailed via tables, diagrams in leaflet.—*Warren Steam Pump Co., Inc., Warren, Mass.*

Circle 209B on Reader Service Card

Industrial Burners

Oil and gas burners for industrial use are detailed in bulletin P-152. 8 pages.—*Coen Co., 40 Boardman Place, San Francisco 3.*

Circle 209C on Reader Service Card

Industrial Motors

Leaflet treats large industrial squirrel-cage motors and industrial transformers.—*Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14.*

Circle 209D on Reader Service Card

Steam Traps

Leaflet describes industrial steam traps, offers dimension tables.—*W. H. Nicholson & Co., 12 Oregon St., Wilkes Barre, Pa.*

Circle 209E on Reader Service Card

Pillow Blocks

Booklet offers specifications and dimensions of new line of steel pillow blocks. 8 pages.—*Dodge Mfg. Corp., Mishawa, Wis.*

Circle 209F on Reader Service Card

Control Equipment

Analytical Balances

Bulletin describes advantages of single-pan balance.—*Fisher Scientific, 685 Greenwich Ave., New York 14.*

Circle 209G on Reader Service Card

Blending Controls

Use in brewing of control system to produce uniform taste and alcoholic content is explained in leaflet.—*Foxboro Co., Foxboro, Mass.*

Circle 209H on Reader Service Card

Level Control

Bulletin F-101 treats features and applications of level control with types of electrodes available. 8 pages.—*Fielden Instrument Div., 2920 N. 4th St., Philadelphia 33.*

Circle 2091 on Reader Service Card

Vibration Analysis

Pamphlet covers vibration analysis instrument through text, photos.—*International Research & Development Corp., Columbus, Ohio.*

Circle 209J on Reader Service Card

Power Measurement

Technical data on application of power measurement transducers to process control is presented in Bulletin 15-16. 14 pages.—*Minneapolis Honeywell, Brown Instruments Div., Philadelphia 44.*

Circle 209K on Reader Service Card

Temperature Transmitters

Role of temperature primary element transmitter as a resistance thermometer temperature element is treated in leaflet.—*Swartwout Co., 18511 Euclid Ave., Cleveland 14.*

Circle 209L on Reader Service Card

Detector System

Problem of temperature of stored grain is treated in bulletin explaining detector system. 16 pages.—*Hotspot Detector, Inc., 426 Keo Way, Des Moines, Iowa.*

Circle 209M on Reader Service Card

Filling Scale

Automatic filling scale,—Model 400N—is described in leaflet.—*Thayer Scale & Engineering Corp., East Water St., Rockland, Mass.*

Circle 209N on Reader Service Card

Contact Controllers

Vapor actuated electric contact controllers are explained, with dimensions and specifications, in leaflet.—*H. O. Terice Co., 1420 W. Lafayette Blvd., Detroit 16.*

Circle 209O on Reader Service Card

Pneumatic Valves

Bulletin 8503 describes pneumatic butterfuly contral valves designed to regulate flow of air, gas, liquids, or steam. 4 pages.—*Minneapolis Honeywell Regulator Co., Philadelphia 44.*

Circle 209P on Reader Service Card

Test Kit

Portable, wide-range flow test kit for lab research and field flow checking work is described in leaflet.—*Fischer & Porter Co., Hatboro, Pa.*

Circle 209Q on Reader Service Card

Control Valves

Illustrated Bulletin 101A explains characteristics and advantages of industrial air power, describing three types of air control valves. 12 pages.—*Ross Operating Valve Co., Detroit 1.*

Circle 209R on Reader Service Card

Integro-Differential Analyzer

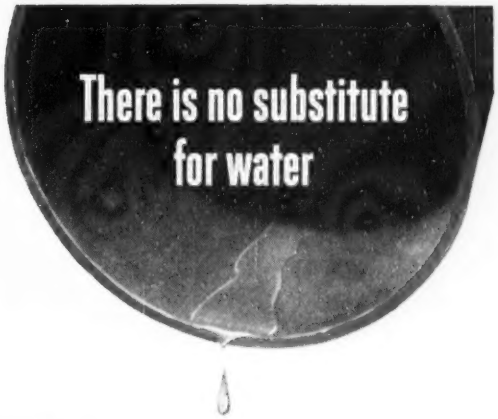
Photos, charts, and tables in bulletin deal with features of integro-differential analyzer. 12 pages.—*Computer Corp. of America, Burlingame Assoc., 103 Lafayette St., New York 13.*

Circle 209S on Reader Service Card

Transmission Systems

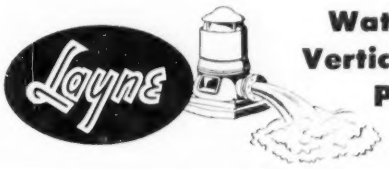
Pneumatic, magnetic, electric, electronic, and electronic-follower transmission systems are listed in Catalog T-250. 20 pages.—*Fischer & Porter Co., Hatboro, Pa.*

Circle 209T on Reader Service Card



. . . and there is no substitute for EXPERIENCED ENGINEERING in developing a dependable water system.

Let Layne engineers help you plan ahead on your water needs. Contact your nearest Layne Associate Company or write Layne & Bowler, Inc., Memphis 8, Tenn.



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For quality of flavor and aroma, stability, preservative value, and other attributes, no seasoning agents can compare with the natural product. Tropical sun and fertile soil create a product whose perfection may be challenged—but never equalled—by the laboratory. Men have thrived on the use of natural spices for many centuries, for the simple reason that they are natural. If you want repeat business, if you want to be sure your food products are the finest—depend on nature. Buy natural spices!

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You asked for it . . . AND IT'S IN THE WORKS!

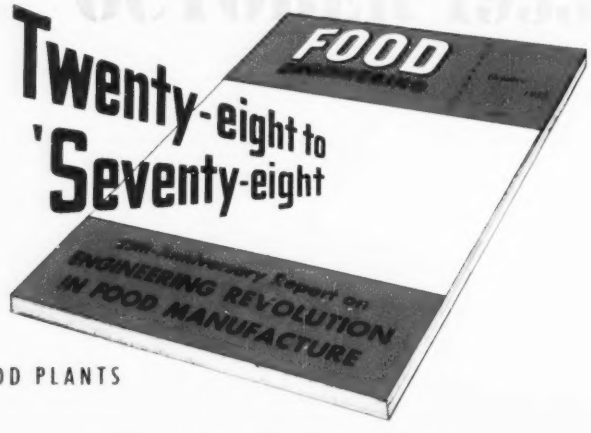
Readers voted for a special theme for FOOD ENGINEERING's Anniversary Issue — and they're going to get it

Perhaps you were one of the cross-section of FE subscribers who participated in our publisher's *Anniversary Issue Poll* last August. We asked FE subscribers in 4,200 food plants whether they wanted a *regular* issue on our 25th Anniversary next October . . . or a *special theme* issue, reviewing the food-plant engineering progress of the past 25 years, and projecting present trends into the *next* 25 years.

The results were overwhelming — 12-to-1 in favor of that special theme!

We thank these readers for their verdict. And we promise *all* our readers that *'Twenty-Eight to 'Seventy-Eight* (as we'll call that issue) will surpass even the top-notch performance you have come to expect of FE's "regular" issues. It will be an issue you'll want to keep and refer to for years.

By the way, are you sure you'll *receive* that October issue? If you receive a subscription renewal notice in the next few months, return it promptly. High costs will prevent our printing many extra copies of *'Twenty-eight to 'Seventy-Eight.*



FOOD ENGINEERING

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McGRAW-HILL'S SHOW-HOW BOOK FOR ALL FOOD PLANTS

Sugar Filtration

Leaflet covers filtration in sugar processing operations through photos, charts.—*Niagara Filter Corp., 3080 Main St., Buffalo 14.*

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Laboratory Stirrer

Sparkless shaded-pole motor lab stirrer featuring hollow spindle design is covered in release.—*Eberbach Corp., Ann Arbor, Mich.*

Circle 211B on Reader Service Card

Gas Detectors

Bulletin 201 deals with carbon monoxide protection through detector unit. 12 pages.—*Taller & Cooper, 75 Front St., Brooklyn 1.*

Circle 211C on Reader Service Card

Control Panels

Leaflet covers industrial control panels, via text and illustrations.—*Industrial Control Panel Co., 24 E. Illinois St., Chicago 11.*

Circle 211D on Reader Service Card

Materials Handling

Grommet V-Belt

Leaflet explains features of spliceless grommet v-belt.—*Allis-Chalmers Mfg. Co., Milwaukee 1.*

Circle 211E on Reader Service Card

Balance Manual

Booklet contains advice on location of balance units, discussion of balance technique, and information on balance care and use. 32 pages.—*Christian Becker, Div. of Torsion Balance Co., Clifton, N. J.*

Circle 211F on Reader Service Card

Bread Handling

Utilization of lightweight, nesting-type wire trays and collapsible two-wheel cart in bread handling is explained in pamphlet.—*Fanner Metal Products Co., 2172 St. Clair Ave., Cleveland 14.*

Circle 211G on Reader Service Card

Compact Fork Truck

Operational features are given in bulletin on Model M fork truck, compact in its space-saving design. 4 pages.—*Lewis-Shepard Products, Watertown, Mass.*

Circle 211H on Reader Service Card

Frozen Food Wrapper

Features of high-speed frozen food wrapper are presented in bulletin.—*Package Machinery Co., Springfield, Mass.*

Circle 211I on Reader Service Card

Magnesium Dockboards

Lightweight, heavy-duty magnesium dockboards are described in illustrated leaflet.—*Magnesium Co., of America, East Chicago, Ind.*

Circle 211J on Reader Service Card

Spiral Conveyors

Catalog 851 deals with line of spiral conveyors, offering photos, graphs, tables. 48 pages.—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

Circle 211K on Reader Service Card

Bag-Sewing Conveyors

V-belt conveyor for transportation of paper, cloth, or burlap bags from filling and weighing equipment through bag-closing operation presented in bulletin.—*Richardson Scale Co., Clifton, N. J.*

Circle 211L on Reader Service Card

Gravity Conveyors

Bulletin covers types of gravity conveyors, including roller and wheel conveyors. 16 pages.—*Packing Equipment Div., Food Machinery & Chemical Corp., Riverside, Calif.*

Circle 211M on Reader Service Card

Composite Containers

Extensive range in shape, size, closure for fiber-body, metal-end cans is treated in leaflet.—*Container Co., Inc., Phillipsburg, N. J.*

Circle 211N on Reader Service Card

Polyethylene Bags

New line of all-purpose sqeeze-type polyethylene bags is treated in leaflet.—*Shellmar Products Corp., Mount Vernon, Ohio.*

Circle 211O on Reader Service Card

Case Liners

Moistureproof, watertight case liners made from asphalt-laminated double-creped kraft paper are dealt with in pamphlet.—*Cincinnati Industries Inc., Cincinnati 15.*

Circle 211P on Reader Service Card

Plant Supplies

Clay Tile

Employment of adhesives in installation of clay floor and wall tiles in food processing plants is subject of specification release. 22 pages.—*Tile Council of America, 10 E. 40th St., New York 16.*

Circle 211Q on Reader Service Card

Thermoplastic Gaskets

Bulletin covers line of Teflon gaskets, rings, sheets, tubes, tape, box packings, and valve stems. 8 pages.—*Raybestos-Manhattan, Inc., Manheim, Pa.*

Circle 211R on Reader Service Card

Plastic Pipe

Brochure offers data on flexible, semi-rigid, rigid high-impact, and rigid polyvinyl chloride types of plastic pipe.—*Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.*

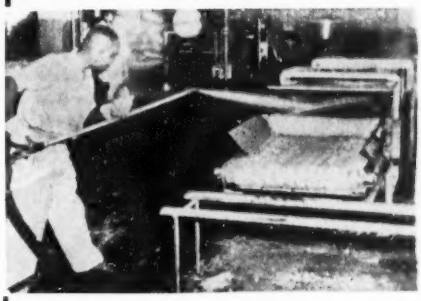
Circle 211S on Reader Service Card

Steel Tubing

Seamless steel and stainless steel tubing and welding fittings are discussed in Bulletin 103-Z. 12 pages.—*Globe Steel Tubes Co., Milwaukee 46.*

Circle 211T on Reader Service Card

100 psi DISCHARGE PRESSURE
from 5 psi INLET STEAM



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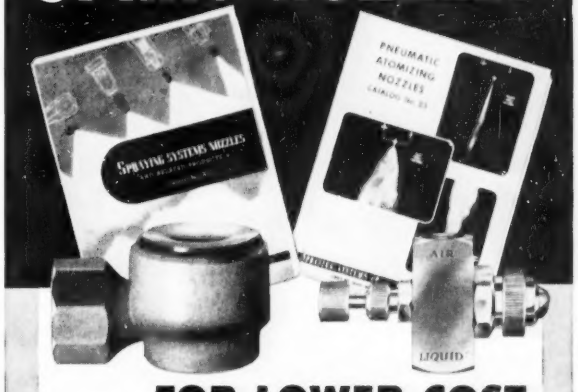

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Welding Processes

Equipment and techniques enabling fusion-bonding of hard facing alloys to metal parts, are explained in pamphlet.—*Wall Colmonoy Corp., 19345 R. St., Detroit 3.*

Circle 213A on Reader Service Card

Stainless Tubing

Booklet covers manufacture of line of stainless steel tubing and pipe, listing sizes and types. 8 pages.—*Damascus Tube Co., Greenville, Pa.*

Circle 213B on Reader Service Card

Electrical Insulation

Booklet describes new electrical insulation through photos, graphs, charts. 8 pages.—*Dow Corning Corp., Midland, Mich.*

Circle 213C on Reader Service Card

Cast Plastics

Clear, rigid plastic sheets and insulation sheet and rod are described in leaflet.—*Cast Optics Corp., Riverside, Conn.*

Circle 213D on Reader Service Card

Cottonseed Oil

"Packaged" plants enabling cottonseed crusher to convert to solvent extraction from hydraulic or screw press operation are treated in brochure. 8 pages.—*Lukenweld, Coatesville, Pa.*

Circle 213E on Reader Service Card

Rust Preventives

Application of inhibiting paint over rusted surface is feature of rust preventive discussed in leaflet.—*L. Conneborn Sons, Inc., 80 Eighth Ave., New York 11.*

Circle 213F on Reader Service Card

Surfacing Material

Pamphlet deals with corrosion-proof surfacing material.—*Ceilcote Co., 4832 Ridge Rd., Cleveland 9.*

Circle 213G on Reader Service Card

Water-Repellent

A clear water-repellent for use on untreated exterior masonry surfaces is discussed in folder.—*A. C. Horn Co., Inc., Long Island City*

Circle 213H on Reader Service Card

Miscellaneous

Milk Solids

Series of articles on nutritional value of non-fat milk solids are reprinted in booklet. 20 pages.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.*

Circle 213I on Reader Service Card

Sorbitol Data

Applications and chemical characteristics of sorbitol, as used in food, chemical, other industries, are dealt with in *The Sorbitol Story.* 24 pages.—*Atlas Powder Co., Wilmington 99, Del.*

Circle 213J on Reader Service Card

Communications

Booklet deals with industrial and commercial uses of air-tube inter-plant communication system. 50 pages.—*Lamson Corp., Syracuse 1, N. Y.*

Circle 213K on Reader Service Card

Telephone System

Advantages of private business telephone systems are pointed out in illustrated brochure. 12 pages.—*Automatic Electric Sales Corp., 1033 W. Van Buren St., Chicago 7.*

Circle 213L on Reader Service Card

Slaughtering Equipment

Catalog 62-A deals with line of cattle, sheep, and calf slaughtering equipment. 64 pages.—*Allbright-Nell Co., 5323 S. Western Blvd., Chicago 9.*

Circle 213M on Reader Service Card

Dispenser Head

Cargo silica gel and desiccite dispenser head is discussed in pamphlet.—*Cargo Packers, Special Products Div., 73 Rutledge St., Brooklyn 11.*

Circle 213N on Reader Service Card

Preventive Maintenance

Leaflet describes how visible records eliminate need for large emergency crews and reduce down-time.—*Remington Rand, Inc., 315 Fourth Ave., New York 10.*

Circle 213O on Reader Service Card

Industrial Maintenance

Equipment maintenance, plant lighting, housekeeping, air, noise conditioning are subjects of booklet. 12 pages.—*Wheeler Assoc. Inc., 15017 Detroit Ave., Cleveland 7.*

Circle 213P on Reader Service Card

Record Microfilming

Pamphlet describes service for placing records permanently on film.—*Remington Rand Inc., 315 Fourth Ave., New York 10.*

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Fatty Acids

Technology and use of fatty acids from all-industry viewpoint is treated in illustrated booklet. 18 pages.—*Fatty Acid Div., Assn. of American Soap & Glycerine Producers, Inc., 295 Madison Ave., New York 17.*

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Business Executives!

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FOOD TECHNOLOGIST, 28, University graduate, desires a change. Experience covering quality control, formula development, cost, factory operation and management, dealing with vegetable, and fruit canning. Also pickles and frozen foods. PW-7093, Food Engineering.

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Additional Opportunity Advertising on page 216

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we will sell at

PUBLIC AUCTION

on

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REAL and PERSONAL PROPERTY of the canning plants

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Triangle A-4C-A Electra Tri Pak Fillers, fully automatic, 100 per min., with conveyors and feed.
Horix 14, Kiefer 22 and U. S. 24 spout vac. Fillers.
Two Capem 4 head Cappers
3 Kiefer Bottom Up Air Cleaners
3 Standard Knapp Bottle Packers
7 Ermold 6 and 8 wide automatic Labelers
1 Creamery Package Homogenizer 200 gal.
1 Cherry Burrell Spray Pasteurizer 200 gal.
1 Republic Flexmaster 16" Filter
1 Sparkler Stainless Steel 14-4 Filter
2 Filco Mod. 50 Filters
Stainless Steel Tanks, Pumps, Valves
1—Stainless Steel 400 gal. Jacketed Tank
Roller Conveyor 16" and 26" wide

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Schutte and Koerting Gear Type

Attractive price. Immediate delivery. Suitable for handling a wide variety of delicate or concentrated food products without contamination.

7—No. S3A, capacity 40 G.P.M.
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SERIAL # 322, with extra oversize 100# hopper—Purchased new 1952 used very little—for grinding sugar.

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One FMC, Model 15 FROZEN FOOD FILLER

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Cherry-Burrell Viscolizer

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"ADSCO" STEAM FLOW METER, orifice type.

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Proper Temperature for Frozen Foods

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15,000 cases 12 oz.

2 dozen to carton, white finish

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3—Lee 300 gal. T316 stainless steel salad dressing starch base cookers, water jacketed, double motion agitators.

8—3000 gal. Horiz. Stainless Steel Tanks, insulated & agitated, sanitary fittings, excellent for transporting, storing or holding milk, food products, wines, etc.

35—Stainless Steel Tanks, 30, 60, 100, 150, 200, 300, 400, 500, 1000, 1400, 3000, 4200, 5700 gal.

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8—15,000 gal. Vertical Steel closed Processing Tanks, 80# int. W.P., with 970' 3" pipe coil and turbine agitator with 40 HP drive.

2—Triangle G-2-C Elec-Tri-Pak Weighers & Fillers.

1—Elgin Auto. Twin Piston Filler, St. St.

2—Moionnier #90 Rotary Vacuum Fillers, 14-spout; stainless.

1—Pneumatic Scale Auto. Duplex Labeler, Front & Back.

1—Kyler model "H" Wrap Around Labeling Machine, to #10 cans.

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MACHINERY

FOR FOOD & CHEMICAL PROCESSING

- World Rotary Auto. Labeler
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- 8 SPT Gravity Siphon Filler
- Capem Automatic Screw Capper
- Horman 10 Disc Filter with Pump & Motor
- Conveyors and Acc. Tables

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Buying it at the RIGHT Price
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NEW STAINLESS EQUIPMENT
Fabricated to Your Specifications

KETTLES, TANKS, COOKERS, VACUUM PANS, CONCENTRATORS, EVAPORATORS

New Stainless Steel Steam Jacketed Kettles in all standard sizes
New Stainless Steel Vertical and Horizontal Tanks, all sizes
Rebuilt and Tested Copper steam Jacketed Kettles, all sizes
Stainless Steel Oval (truck type) Milk Tanks:
2200 Gal. 49"x69"x16½"
3500 Gal. 49"x72"x22"
O. A. Smith Glass Lined Horizontal Tank: 5250 Gal. 8' x 14'
Steel Jacketed Tank: 5200 Gal. welded; 9'6" x 9'10½"
2000 Gal. Copper Vacuum Pan or Cooker with coils; 7' diameter x 10'6" high
3 Steel Horizontal Jacketed Vac. Cookers; 4' x 7'7½"; with agitators
2600 Gal. Steel Closed Top Jacketed Kettle; 8' x 7' with agitator
650 Gal. Dopp Jacketed, Agitated Kettles or Reactors; 68" x 61"
Buflovak 500 Gal. Steel Jacketed Agitated Kettle; 48" x 62"; 3 HP
Pfaudler Jacketed Glass Lined Reactor 4' x 4'
500 Gal. Stainless Steel Jacketed Reactor; 6' x 6'
250 Gal. Aluminum Vacuum Pan with Copper Jacket; 40" Dia. x 60"
Stainless Steel Flash Tank welded construction; with stainless tube bundle; 8' x 6'
Stainless Steel Screw Type Continuous Cooker with 7 Steam Injectors; 7' screw
Devine Single Effect Calandria Type Evaporator; 28" x 8' with Barojet Condenser
Croll Reynolds Vacuum Evaporator 30" x 5' of MONEL with Evactor Cooler etc.
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Shriver and Sperry Plate & Frame Filter Presses with wood, iron, rubber, aluminum contact parts
Disc and Plate Filters by Alsop, Ertel, Sparkler, Niagara in all sizes and capacities

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Food Machinery Corp. M.&S. 10 Pocket Stainless Steel Fillers now set for baby food, tomato paste and similar products; adjustable
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Horix Stainless Steel Model HEV 14 Stem Rotary Gravity-Vacuum Fillers
Mojonnier No. 90 Stainless Steel 14 head Rotary Gravity-Vacuum Fillers
Berlin Chapman Rotary Stainless Steel Juice Fillers for No. 2 and No. 10
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Pneumatic Scale Semi and Fully Automatic Samco Type Vacuum Fillers
FMC Straight Line and Rotary Stainless Steel Syphon Fillers for Pts. to Gals.
FMC Straight Line Stainless Vacuum Fillers; all sizes Pts. to Gallons
Elgin, Filler Mach. Co. and Powers, Hope Piston Fillers from single to 11 Pistons; stainless or plated contact parts all size containers
Fillers, semi automatic and fully automatic for Powders and Granulars by Stokes and Smith, Triangle, Whiz . . . sack and bag Packers too.

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J. H. Day Egg Clipper Type Jacketed Mixers; 20" x 22" x 28"
Robinson Unique Stainless Steel Powder Mixer; 17" x 20" x 30"
NEW and REBUILT Powder Mixers in mild steel and stainless steel usually every wanted size in stock
J. H. Day extra heavy JUMBO Mixer; 94 cu. ft. capacity; 44" x 78" with extra heavy ribbon; 10 H.P. motor
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Stainless Tumbling Barrel Mixer; 5' x 5'; with 3 HP. and reducer

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Selectro Shaker Screens, single and multi deck; some in Stainless
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Smithway Shaker Screens with stainless deck; 40" x 90"; 1 HP
Sprout Waldron single deck Gyratory Screen; 40" x 72"; 3 HP
Sutton & Steele Separator Type IND Model B100 with 5 HP

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Langsenkamp and Food Machinery Corp. Model B EZ adjust Stainless Pulpers various models
Chisholm Ryder, American Utensil, Stainless Steel Model B Juice Extractors
HPM Hydraulic Fruit Presses for Cider, Juices, etc. State size required
French Oil Mill Cage or Curb Press 24" x 36"; 450 ton with Hydr. Pump

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Urschel Model B Dicers with 2 H.P. motors; stainless contact parts
John E. Smith Sterling Dicers model EMID with motors
Briterly Double Head Citrus Peel Slicers or Chippers
Biro Stainless Meat Saw Model 33 with 1½ H.P. motor
John E. Smith, Sterling Carborundum Type Batch Vegetable Peelers
Pfaudler and Food Mach Co. Caustic and Steam Peelers; hi capacity
Meat and Food Choppers and Grinders by John E. Smith, Brecht, Enterprise etc.
Kraut Cutters, Corers, Apple Slicers, Corers and other Grinders, Hammer Mills

LABELERS

Wrap-a-round Can Labelers by Standard, Knapp, Burt, Kyler, Nu-Way etc. Some highly adjustable; others set for one size from No. 2 to No. 10
Semi-Automatic Spot Labelers by World, Ermold, New Jersey and others
Fully automatic Labelers by World, Pneumatic Scale, Ermold others straight line and rotary adaptable to your container; state requirements

MISCELLANEOUS FOOD EQUIPMENT

Air Compressors
Air Conditioners
Boilers
Blowers and Fans
Bottle Rinsers
Can Seamers-Sealers
Can Washers
Cartoners
Casers or Boxers
Conveyor (Belt, Roll, Screw
Crushers
Dish Washers
Dust Collectors
Elevators, Hoists, Stackers
Grinders (all types)
Hammer Mills
Heat Exchangers
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Humidifiers-Dehydrators
Ice Breakers-Crushers
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Pulverizers-Mills
Pumps (Vac., Centr. Rotary etc.)
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THE ONE *Great* NAME IN VALVES

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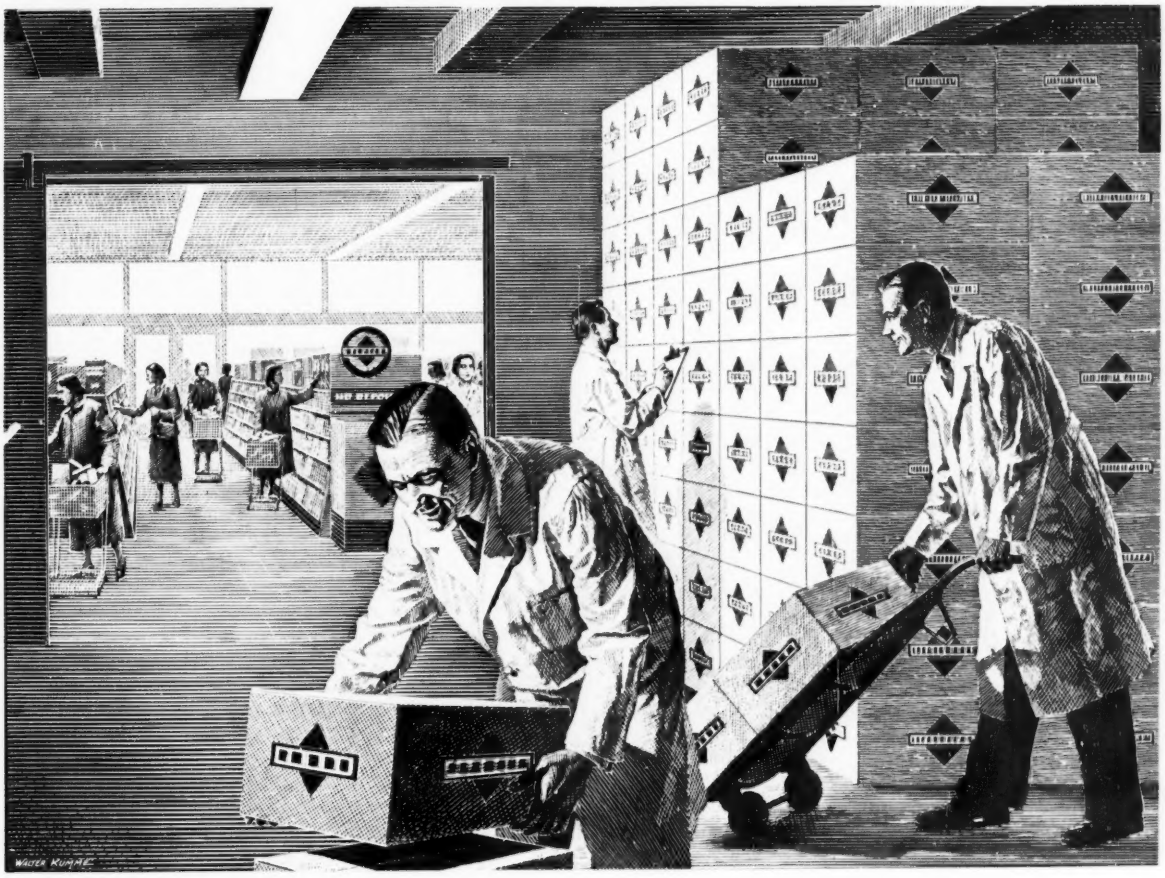


Your Product is Well-Dressed and "Sell-Dressed" in a Gaylord Container

Gaylord Boxes

Their unseen quality gives you an extra margin of safety.

Strikingly printed Gaylord shipping containers keep on selling your name and product wherever they go. This effective and economical medium is a natural to increase the impact of your advertising and other promotions.

Your nearby Gaylord sales representative will be happy to tell you more about these "traveling billboards." You will find him listed under Boxes (Gaylord) in the classified pages of your phone book.

GAYLORD CONTAINER CORPORATION

General Offices: ST. LOUIS • Sales Offices Coast-to-Coast

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT BAGS AND SACKS • KRAFT PAPER AND SPECIALTIES

Technical data on the revolutionary new

holo-flite*

(HOLLOW-FLIGHT)

PROCESSOR

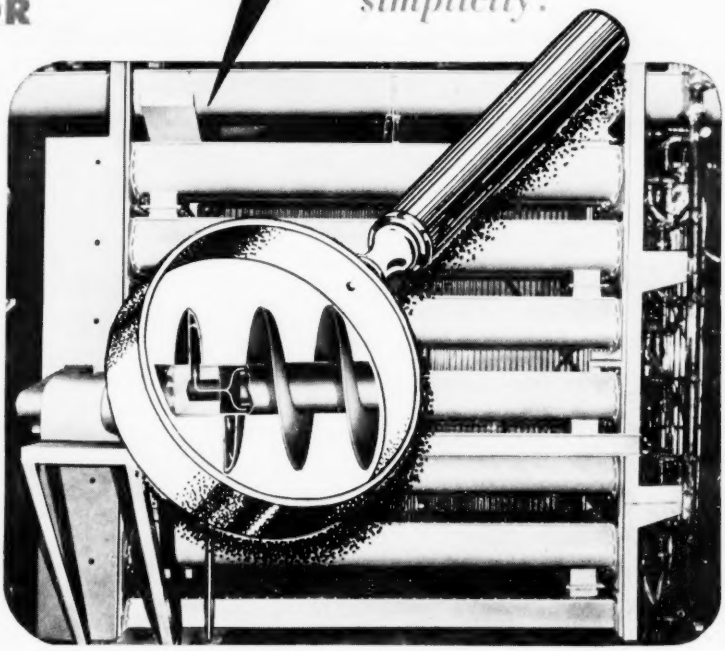
—the Continuous-Flow Heat-Exchanger that is setting new standards of *compactness! adaptability! simplicity!*

If you have processing operations where slurries, solids, pulps or pastes must be cooled or cooked, be sure to investigate the many unique advantages of the newly-developed HOLO-FLITE Processor before you install *any* heat-exchange equipment.

Here's the HOLO-FLITE principle . . .

Two or more screw conveyors rotate slowly in a trough. The blades and shaft of each flight of conveyors are hollow, with provision for circulating the heat-transfer agent through them. The product to be cooled or cooked is moved along the trough, being constantly rotated into, around, over and under the conveyor screws as it moves.

Thus, a continuous thermal transfer takes place between the product and the heat-transfer fluid circulating in the blades. The product is cooled or cooked in *continuous-flow* without the "stop-and-go" losses of batching operations . . . and cooled products can be packaged directly from the HOLO-FLITE discharge—saving space, time and additional handling.



THIS 6-TIER HOLO-FLITE cools 7 tons of cottonseed press cake per hour from 285° to 89°F. *in a total floor space of only 28 sq. ft.* *(Insert)* Enlarged cutaway view of HOLO-FLITE screw showing heat-transfer principle.

Here are typical HOLO-FLITE advantages

The HOLO-FLITE principle is so unique it is setting completely new standards of performance in *many* ways. For example . . .

*Reg. T.M.

The HOLO-FLITE Saves Space—It requires as little as 1/5th the space of other units of comparable capacity because (1) it has far greater heat-transfer area per cubic foot of space . . . and (2) the flights can be "tiered" as high as desired to give maximum capacity in very small floor areas.

The HOLO-FLITE is Versatile—Processed product can be fluid, pulp or paste—granular, crystalline or powdered solid. Heat-transfer fluid can be refrigerant, cooled or ambient water, steam, oil or any other desired fluid, at any normal temperature range.

The HOLO-FLITE Is Dust-Free—Its gentle action provides large heat-transfer action without dust and with negligible particle abrasion. Simplifies installations, assures higher quality product.

The HOLO-FLITE Is Adaptable—It can easily be designed to handle virtually any capacity by (a) varying the diameter of the screws (7" to 16") . . . (b) varying the length of the screws (8 ft. to 20 ft.) . . . (c) varying the number of intermeshing screws per trough (2, 4, or 6) . . . and (d) varying the number of tiers stacked on top of one another (1 to 10, or more).

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1016 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA

CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2

1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4

PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

The HOLO-FLITE is in daily operation on such typical products as sand, cement, cottonseed cake, soybean meal, borax, salt, sugar, baby foods and many other equally-varied products.

What is your problem? *Our engineers will be glad to assist you in making the most of* HOLO-FLITE *advantages. Write wire, or phone the office nearest you!*

Want More Facts? This 8 page booklet describing the HOLO-FLITE in greater detail will gladly be sent on request. No obligation, of course.